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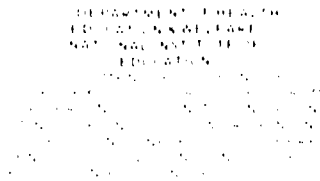
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## ABSTRACT

The purpose of this evaluation is to describe and assess the political, social, economic, and educational outcomes of the voucher demonstration, and the implications of these outcomes for public policy issues. The basic hypotheses of the Demonstration, the basic public policy issues, the major evaluation questions to be considered are set forth, and an organizational framework is specified for the analysis. The salient problems of data analysis and strategies for performing the central tasks of the evaluation are considered. Utilizing 12 specified information categories, the report presents a strategy for the inspection and aggregation of evaluation findings appropriate to address broad issues of public policy and enumerates specific procedures for deriving public policy implications from the evaluation of demonstration outcomes and processes. The plan concludes with discussions of a scheme for the management and organization of the evaluation, a schedule of the work to be performed, and the products to be delivered to OEO.

(Author/DN)

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TECHNICAL ANALYSIS PLAN FOR  
EVALUATION OF THE OEO ELEMENTARY  
EDUCATION VOUCHER DEMONSTRATION:  
TECHNICAL DISSERTATION

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## INTRODUCTION

This report presents Rand's Technical Analysis Plan for the evaluation of the proposed OEO Elementary Education Voucher Demonstration (EEVD). The purpose of the evaluation is to describe and assess the political, social, economic and educational outcomes of the voucher demonstration, and their implications for issues of public policy. The Plan assumes an 18-month pre-demonstration period beginning in March 1972, followed by five consecutive one-year demonstration periods beginning in September 1973 at two to five demonstration sites, with a two-year post demonstration period at each site.

The Rand Technical Analysis Plan sets forth the basic hypotheses of the EEVD and the basic public policy issues and major evaluation questions to be considered, and then moves directly to the specification of an organizational framework for the analysis. We first establish twelve information categories to organize the key findings of the analysis. The aim is to help researchers and policymakers understand the bearing of these findings on major issues of public policy. We then specify 40 outcome dimensions of concern to the evaluation. These dimensions of possible demonstration outcomes are the critical variables of the analysis. The plan for data collection and analysis is straightforward: We first define the relevant indicators whose measurement will help us to specify the value and quality of each dimension of program outcomes. We then detail the sources of the data that evaluation staff will collect on each indicator, and the data collection methods that will be employed. Finally, we identify the techniques for analyzing this data for each indicator.

Utilizing the information categories that had been specified earlier, the plan then presents a strategy for the inspection and aggregation of evaluation findings as appropriate to address broad issues of public policy, and enumerates specific procedures for deriving public policy implications from the evaluation of demonstration outcomes and processes. Finally, the plan presents a scheme for the management and organization of the evaluation, and a schedule of the work to be performed and the products to be delivered to OEO. Figure a presents a schematic overview of the Technical Analysis Plan.

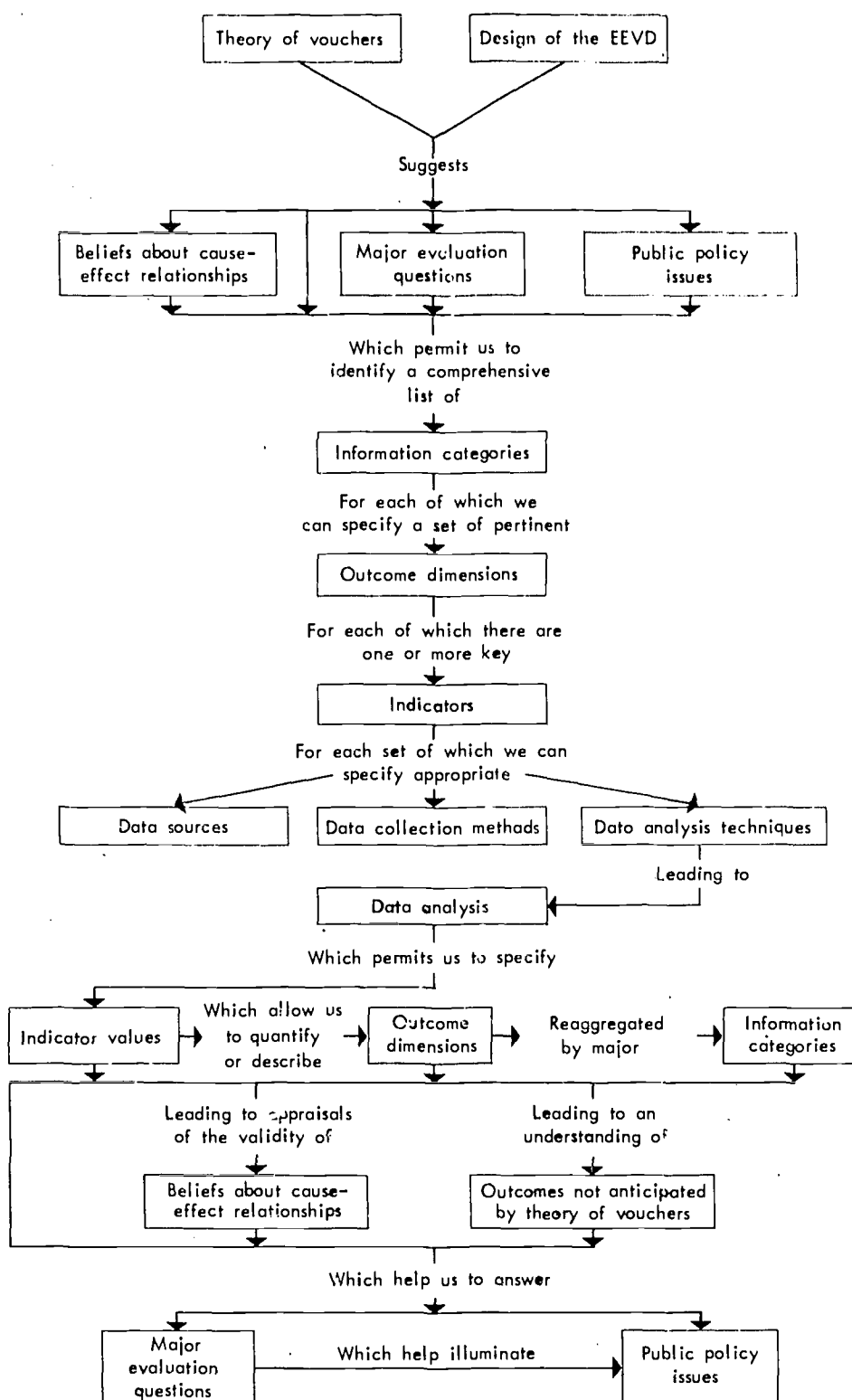


Fig. a—Schematic representation of Rand technical analysis plan

The Technical Analysis Plan is presented in the following sections of Volume I:

- I. FRAMEWORK -- Theory of the EEVD, public policy issues and major questions of the evaluation, information categories and outcome dimensions.
- II. DESIGN CONSIDERATIONS -- Implications for evaluation design of EEVD characteristics and problems associated with large-scale social demonstrations.
- III. DATA COLLECTION AND ANALYSIS -- The salient problems of data analysis, and strategies for performing the central tasks of the evaluation.
- IV. OUTCOMES AND POLICY -- A plan for reaggregating evaluation findings in support of public policy conclusions.
- V. MANAGEMENT AND PLANNING -- The plan for management and organization of evaluation tasks.

#### APPENDICES TO THE TECHNICAL ANALYSIS PLAN

Volume II presents Rand cost and price information.

A draft technical plan for surveys to be conducted as part of this evaluation was prepared by Field Research Corporation under contract to Rand, and was forwarded to OEO on February 7, 1972, in accordance with RFP specifications.

## 1. FRAMEWORK

### THEORY OF THE VOUCHER INTERVENTION

There have been many varieties of voucher plans, and a core of basic theoretical propositions about the effects of a voucher system is readily identifiable. We set forth below what we believe to be a fair statement of the basic hypotheses of the EEVD, based on the study prepared by the Harvard Center for the Study of Public Policy, and on materials prepared by OEO. The assumed chain of cause and effect relationships is represented in Figure 1-1.

The propositions are:

#### Increased Choice

- 1.0 The voucher arrangements will increase the choice of schools available to parents.
- 1.1 The demonstration arrangements will provide effective incentives for the organization of new schools.
- 1.2 The voucher arrangements will allow public school parents to choose among existing parochial or private schools.
- 1.3 Educational vouchers will allow parents to choose among a larger set of public schools.

#### Parental Preferences

- 2.0 Parents will be able to receive information about:
  - a. The rules of the voucher arrangements.
  - b. The programs and curricula of schools in the potential set of choices in sufficient depth for them to develop rational preferences among schools in the choice set.
- 2.1 Parents will have or will develop preferences among schools related to variations in curriculum, teaching practices, student composition, or to other differences among EEVD schools.

#### Parental Influence and School Response

- 3.0 Parents' wider choice among schools will increase their influence on the administrative policy of the schools.



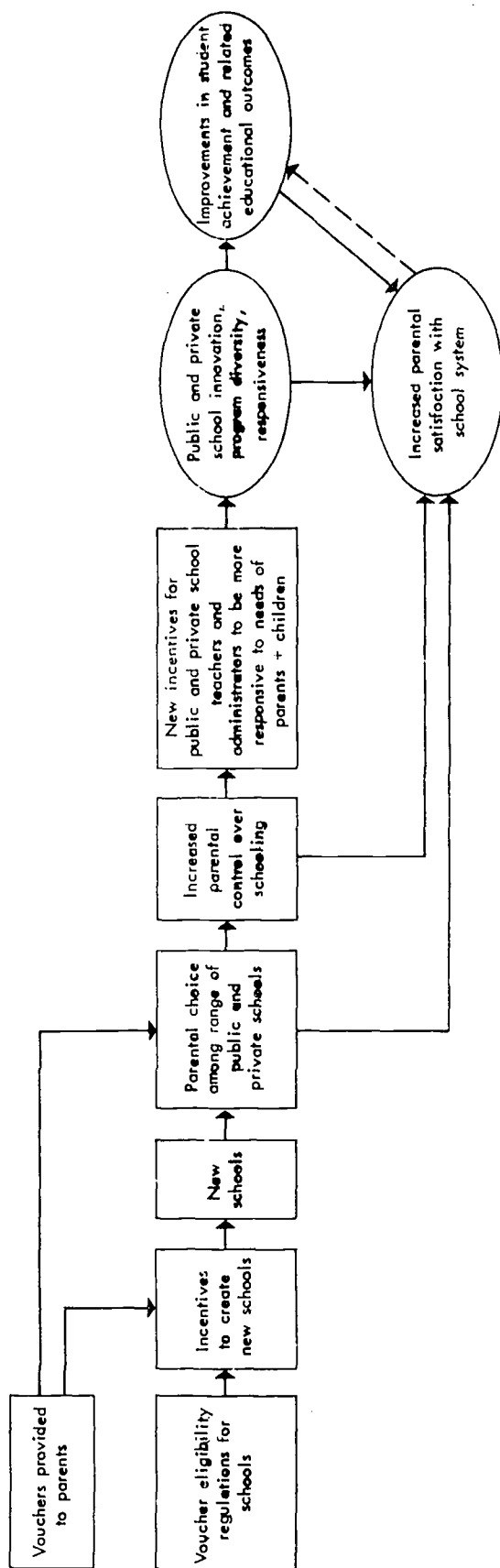


Fig. 1-1 — Model of assumed cause and effect relationships in EEVD

- 3.1 Wider choice, and the requirement to make a choice from among the set of schools, will increase parental incentives to participate in activities that will heighten their influence on school administration policies.
- 3.2 Because parental choice among schools will create organizational uncertainty in the year-to-year procurement of resources, school administrators will be motivated to maintain an optimum level of student population in order to meet resource commitments.
- 3.3 To maintain a student population (resource inputs) in line with resource commitments, school administrators will orient their programs to parental preferences.
- 3.4 Because school performance measures will be more available for parental assessment, school administrators will be motivated to be more concerned about the indices parents use to measure organizational performance.

#### Changes in the School System

- 4.0 Voucher arrangements will lead to a new method for the distribution of resources among schools that will provide an incentive for more variety in curricula and programs among schools to meet variations in parental preferences.

#### Improved Achievement

- 5.0 Increased congruence between parental preferences and school outputs will improve students' cognitive and noncognitive achievement.
- 5.1 Parents will be in a better position to select a school, which will lead to an improvement in cognitive and noncognitive educational outcomes.
- 5.2 Schools will have an incentive to modify curricula and programs to meet parental preferences for their target student population, and this, in turn, will improve educational processes and outcomes.

#### Increase in Parental Satisfaction

- 6.0 The changes in the school system produced by the voucher arrangement will increase parental satisfaction with the school system.

- 6.1 The increase in the school choices available to the parents will increase parental satisfaction.
- 6.2 The increase in parental influence and control of the school's curricula and programs will increase parental satisfaction.
- 6.3 The changes in the curricula and programs of the school will increase parental satisfaction.
- 6.4 Improvements in student performance and achievement will increase parental satisfaction.

These propositions are theoretical assumptions and none is self-evidently true. The EEVD seeks to generate empirical data about as many of these propositions as possible.

#### PUBLIC POLICY ISSUES AND EVALUATION QUESTIONS

Inspection of the key propositions of the theory of the EEVD reveals an extensive constituency whose interests may be affected by demonstration processes and outcomes. Students, parents, community members and community leaders, educators, and public servants, both elected and appointed, all have a "stake" in the demonstration. In addition, organization and institutional interests may be deeply affected: the public education system, parochial schools, institutions of government, professional organizations. Finally, there is the elusive but important stake of the public interest, in (1) economy and efficiency in the expenditure of public resources; (2) the amelioration or reduction of social conflict; (3) the effective education of the nation's children; and (4) the maintenance and improvement of fair and workable relations between citizens and their government.

The public policy issues of the EEVD--and the major questions to be "settled" by its evaluation--are derivative of this complex set of public and private interests. The policymaker may ask, broadly--

What is the desirability of extending the voucher mechanism to other communities?

This question, though, has many parts. It asks:

- o What private, organizational, and institutional interests are affected by the voucher mechanism, and to what extent are they compatible or reconcilable?

- o What is the nature of the several public interests in vouchers, and to what extent are these interests compatible with one another and with private interests?

In addition, the policymaker will need to extrapolate demonstration objectives and outcomes to more general guidance for public policy. The original policy question is thus further elaborated:

1. What is the desirability of implementing some mechanism whereby parents can have a more direct voice in choosing the schools their children attend?
2. How should educational diversity, especially the creation of new schools, be encouraged by public policy, if at all?
3. Should some form of public support for private and parochial schools be initiated, and if so, what form should it take?
4. To what extent should "marketplace" incentives be introduced into education, and what form, if any, should such incentives take?

These questions imply one further inquiry:

5. To what extent are (a) vouchers, and (b) the manner in which vouchers were implemented in the EEVD, a necessary and sufficient device for the attainment of the objectives of public policy, including those which are the subject of questions 1-4 above?

In turn, questions dealing with the nature of public and private interests can now be seen to apply independently to each of the broader questions of policy enumerated above, and to related questions that may arise, as well as to the question of vouchers per se.\*

These are complex and difficult issues, involving many subjective and normative choices in addition to empirical analysis. While "answers" to such questions will probably take some form of contingent probability statements ("if \_\_\_\_\_, then \_\_\_\_\_"), a careful and comprehensive evaluation of the voucher demonstration can certainly yield information that helps to make these

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\* Section IV of this plan provides more detailed consideration of public policy issues.

answers better informed. Inspection of the key propositions of the theory of the EEVD, and a review of the public policy questions implied by that theory, reveals the scope of the questions that must be addressed by the evaluation:

1. What has been the effect of the demonstration on the education of elementary school students, especially the disadvantaged?
2. What has been the effect of the demonstration on the available range of choice among educational programs?
3. What has been the impact of the demonstration on equality of educational opportunity?
4. What has been the impact of the demonstration on the economics of public education?
5. How has the demonstration affected the relationship between citizens and their schools?
6. What has been the impact of the demonstration on social and political tensions?

These questions are demonstration-specific; they must be answered comprehensively before the broader implications of public policy can be addressed. Our views regarding these broader issues must for the most part be deduced from what we can first learn about the consequences of the EEVD as a test of the social, political, and educational theories that public policy conclusions stem from.

Clearly, each of these broad questions has many conceptual dimensions, and will require a lengthy and detailed answer. The overarching test of evaluation processes will be the extent to which they succeed in providing complete and accurate answers to these questions; this in turn has a number of operational implications:

We must decide:

1. What general categories of information are of interest.
2. What specific outcome dimensions in each information category must be studied in order to answer evaluation questions.
3. What the relevant indicators are for the study of each outcome dimension.
4. What sources of data are available for each indicator.

5. What data collection methods are appropriate.
6. What data analysis techniques should be utilized.

In the balance of this section we take up the questions of general information categories and specific outcome dimensions (1 and 2 above); Section III provides extended discussions of data collection and analysis, together with summary tables displaying indicators for each outcome dimension, data sources, data collection methods and preferred analytical techniques (3-6 above).

### INFORMATION CATEGORIES

We have selected 12 general categories for the collection of information bearing on the major questions of the evaluation. Their selection is grounded in our estimate of the most convenient way to organize the data clusters suggested by these questions and by the theory of the EEVD. They are listed in Table I-1.

Table I-1

#### INFORMATION CATEGORIES

1. Education results
2. Attitudes of practitioners
3. Programs and processes
4. Attributes of new schools
5. Distribution of students
6. Allocation of resources
7. Financial impact
8. Governance and administration
9. Status of professionals
10. Parent attitudes and responses
11. Community attitudes and responses
12. Consequences beyond demonstration area

Each of these categories of information will bring together data and analyses bearing on our ability to provide answers to the major questions of the evaluation. The categories thus serve an accounting function that

will help us to manage and organize large bodies of data without losing sight of their relationship to the ultimate purposes of the evaluation. Figure I-2 shows the relationship of information categories to major evaluation questions.

#### OUTCOME DIMENSIONS

Each information category will bring together analyses of a variety of program outcome dimensions. Outcome dimensions of interest to the evaluation are suggested by the theory and design of the EEVD, which identify major outcomes and processes that may be expected, and by the major questions of the evaluation and the information categories, which further define the areas of interest to evaluators. The outcome dimensions of interest are listed in Table I-2. This list is provisional in the sense that demonstration processes are provisional; both may change in practice. Figure I-3 displays the relationship of outcome dimensions across professional skill areas to each of the information categories of the evaluation.

In the following section of this Plan, these outcome dimensions, and their associated data collection and analysis requirements, are treated in more detail.

Evaluation questions	Information categories											
	1. Education results	2. Attitudes of practitioners	3. Programs and process	4. Attributes of new schools	5. Allocation of students	6. Financial impact	7. Status of professionals and responses	8. Consequences beyond demonstration area	9. Parent attitudes and responses	10. Community attitudes and responses	11. Consequences beyond demonstration area	12. Consequences beyond demonstration area
1. Education of elementary school students	X	X	X	X	X	X	X	X	X	X	X	X
2. Range of choice among educational programs			X	X	X	X	X	X	X	X	X	X
3. Equality of educational opportunity	X	X	X	X	X	X	X	X	X	X	X	X
4. Economics of public education					X	X	X	X	X	X	X	X
5. Citizen-school relations							X	X	X	X	X	X
6. Critical social and political tensions								X	X	X	X	X

(X indicates that to answer the evaluation question data of the specified type is required)

Fig. 1-2 — Relationship of information categories to major questions of the evaluation



Table I-2

OUTCOME DIMENSIONS

Political/Social

1. Practitioner assessment of local schools
2. Educational goals of practitioners
3. Practitioner's opinion about school integration
4. Practitioner's opinions about EEVD
5. Focus and scope of policy authority
6. Demonstration area relationship to outside agencies
7. Allocation of decisionmaking authority
8. Administrative organization, practice and behavior
9. Legal and constitutional ramifications
10. Position of professionals in community
11. Status perquisites within school system
12. Ethnic and SES distribution of students
13. Parent judgments of educational opportunities
14. Parent assessment of local schools
15. Parent opinions on integration
16. Parent assessment of EEVD
17. Parent participation in education of children
18. Parent involvement in school-related activities
19. Parent mobility
20. Parent involvement in EEVD options
21. Community assessment of local schools
22. Community attitudes toward education
23. Community opinions on integration
24. Community assessment of EEVD
25. Community attitudes on political activism
26. Inter-group conflict and cooperation
27. Political and social participation
28. Political mobilization
29. Voting behavior
30. Political mobilization beyond demonstration area

Economic/Cost

1. Structural changes in educational marketplace
2. Behavior changes in educational suppliers
3. Changes in performance of educational market
4. Changes in resource allocation
5. Changes in fiscal flows

Educational

1. Cognitive achievement
2. Affective growth
3. Educational objectives of school personnel
4. Teaching plans and practices
5. Sociology of the classroom

INFORMATION CATEGORIES	OUTCOME DIMENSIONS																																
	1. Practitioner's goals of local schools	2. Practitioner's opinion about school integration	3. Practitioner's opinion about school integration	4. Practitioner's opinion about school integration	5. Practitioner's opinion about school integration	6. Practitioner's opinion about school integration	7. Practitioner's opinion about school integration	8. Practitioner's opinion about school integration	9. Practitioner's opinion about school integration	10. Practitioner's opinion about school integration	11. Practitioner's opinion about school integration	12. Practitioner's opinion about school integration	13. Practitioner's opinion about school integration	14. Practitioner's opinion about school integration	15. Practitioner's opinion about school integration	16. Practitioner's opinion about school integration	17. Practitioner's opinion about school integration	18. Practitioner's opinion about school integration	19. Practitioner's opinion about school integration	20. Practitioner's opinion about school integration	21. Practitioner's opinion about school integration	22. Practitioner's opinion about school integration	23. Practitioner's opinion about school integration	24. Practitioner's opinion about school integration	25. Practitioner's opinion about school integration	26. Practitioner's opinion about school integration	27. Practitioner's opinion about school integration	28. Practitioner's opinion about school integration	29. Practitioner's opinion about school integration	30. Practitioner's opinion about school integration	31. Practitioner's opinion about school integration	32. Practitioner's opinion about school integration	33. Practitioner's opinion about school integration
1. Education results	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2. Attitudes of practitioners	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3. Programs and processes	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4. Attributes of new schools	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5. Distributions of students	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6. Allocation of resources	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7. Financial impacts	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
8. Governance and administration	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9. Status of professionals	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10. Parent attitudes and responses	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11. Community attitude and responses	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
12. Consequences beyond demonstration area	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x indicates a relationship between the column outcome dimension and the row information category.

Fig. 1-3—Relationship of outcome dimensions to information categories

## II. DESIGN CONSIDERATIONS

This section discusses considerations which have influenced the design of the evaluation. First, we discuss the problems of evaluating large-scale social demonstrations. We then identify salient characteristics of the EEVD, and their implications for the evaluation plan.

### PROBLEMS OF ANALYSIS IN LARGE-SCALE SOCIAL DEMONSTRATIONS

Because large-scale social demonstrations differ from more rigorous social experiments, conventional principles of experimental design are not precisely applicable to their evaluation.\* This does not exempt such evaluations from conventional standards of scientific rigor, nor does it relax the requirement that evaluators address familiar problems of research design, such as concept definition, threats to external and internal validity, definitions of criteria of outcome effects, and problems of evidence and inference. However, it will be difficult or impossible to achieve "acceptable" solutions to many of these problems (in the sense of satisfying criteria of experimental research). The evaluation plan for a large-scale social demonstration must therefore be a flexible and broadly conceived instrument that does not focus narrowly on the relationships between preselected independent and dependent variables. Five characteristics of such demonstrations merit particular emphasis:

1. There is likely to be considerable divergence between the demonstration as implemented in practice and as explicated in plan or theory. Program administrators may modify their objectives or change their practices as new opportunities arise or original goals are judged to have moved out of reach.
2. Criteria of program success are difficult to define and make operational. In practice, they may have to change in order to accommodate shifting program priorities and objectives. Broad program goals such as "responsiveness," "control," or "satisfaction" allow for many operational specifications, and it may

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\* On this problem, see the references listed in Appendix A, "Evaluation Objectives and Methods: A Bibliographical Note."

be difficult to translate these into precise evaluation criteria.

3. Scientific controls are seldom available. The pre-demonstration period in a community may be regarded as a form of control on the effects of demonstration independent variables, or a survey of a non-demonstration community may be used to assess the potential "swamping" effects of concurrent historical events on demonstration outcomes. Nonetheless, pre-demonstration trends cannot be an accurate guide to outcomes that could have been expected in the absence of the demonstration intervention. And it is difficult to assess the mediating effects of control community characteristics that are sui generis on events that could have influenced outcomes in both the control and demonstration communities. Therefore, in many cases, the costs of attempting to maintain controls outweigh the benefits.
4. Key program elements--staff, site, treatment characteristics--are seldom standardized; they vary among communities participating in what is conceptually a single program. Moreover, program elements may vary over the time period of a demonstration in the same community.
5. Unknown intervening variables can be assumed to "contaminate" interventions in a complex social setting. Attempts to construct "scientifically valid" statements about cause and effect relationships misapply the tools of experimental design to non-experimental situations.

These characteristics of large-scale social demonstrations have the following implications for evaluation planning:

1. The relevance and utility of data must be assessed in terms of the objectives and processes of the demonstration as it actually occurs, rather than exclusively in terms of preselected criteria.
2. The evaluation must be sufficiently comprehensive in the scope of its interests and sufficiently fine-grained in the collection and organization of data as to avoid the "tunnel vision" consequences

of concentrating exclusively on preselected variables, or recording only gross program effects. It is vital to know what the demonstration actually consisted of and not merely what the plans were.

3. If public policy inferences are to be drawn (e.g., an assessment of the likely outcome of program replication on a larger scale), the evaluation must include not only an analysis of demonstration operations and results, but also an analytical extrapolation of essential program concepts and components to a larger scale.
4. Theory is not an adequate guide to demonstration processes, relationships, or outcomes, and it cannot be used as it would be in a controlled experiment or a narrow-aim social program, without the risk of failing to capture critical program variables. Theory does however play an important role:
  - o It guides the collection and organization of data by providing an intellectual structure that allows one to set initial priorities for data collection. It also directs the organization of data in a framework that relates information to potential analytical conclusions.
  - o It directs attention to a plausible set of demonstration outcomes and causal relationships, thereby providing initial focus and direction for analytic efforts.
  - o It provides guidance in the formulation of the questions to be answered by the evaluation.
5. In order to grasp the real nature of the intervention, historical description of program processes and consequences is essential.

#### SALIENT CHARACTERISTICS OF THE DEMONSTRATION

The Voucher Demonstration has multiple and diverse objectives. Overall program objectives are:

- o Improved education of children, especially disadvantaged children.
- o Increased parental control over the kind of schooling their children receive, especially parents of disadvantaged children.

- o Increased parental satisfaction with the schooling their children receive, especially parents of disadvantaged children.

These objectives are to be realized as the result of a complex chain of cause and effect relationships which include the following intermediate objectives:

- o Creation of new schools.
- o Parental choices made among a range of public and private schools.
- o New incentives for teachers and administrators to be more responsive to the needs of children.
- o Implementation of educational innovations and program diversity which are responsive to the needs of children.

There are also subsidiary program objectives associated with the implementation and administration of the demonstration and the attitudes and behavior of diverse individuals and collectivities in the community.

Concepts such as "control," "satisfaction," "improvement," (in education), "diversity," "incentives," and "responsiveness" have various possible dimensions; these dimensions must be specified concretely, and indices to measure these dimensions must be defined operationally to permit rigorous assessment of program success.

EEVD objectives include effects on knowledge, attitudes, motivations, and behavior, as well as on the social system. Target groups and institutions include parents, other members of the demonstration area community, educational officials and administrators, teachers, private educational entrepreneurs, schools, and community groups.

The complexity and diversity of program objectives does not allow the utilization of an evaluation plan which concentrates on the causal relationships between well-defined independent and dependent variables. A more open-ended evaluation design is required to capture the relevant variables which affect the demonstration outcomes. Given the difficulty in inferring causal relationships, and the requirement for description (what happened) as well as analysis (why did it happen), the evaluation plan must provide for the collection and display of data at various levels of aggregation in order to avoid obscuring the potential relevance of intermediate and short-range program processes and outcomes in larger generalizations about the demonstration.

A corollary to the multiple program objectives of the EEVD is the wide range and diversity among the units of analysis. Where the unit of analysis is the individual (e.g., a community leader, a school administrator), we may be interested in attributes that are absolute (belonging only to the person, such as age, income, years of schooling), relational (dealing with the person's relations with others, such as number of friends used as sources of information), comparative (in which the person is characterized by comparing him along the dimensions of a given attribute with others among whom this attribute is also distributed; e.g., students with the highest academic achievement), or contextual (in which the individual is described according to some property of a larger social unit to which he belongs; e.g., students in integrated schools).

Collectivities may also be described according to three types of properties: analytical (based on data about each member), structural (based on data about the relations among members), and global (based on information about the collectivity as a unit).<sup>\*</sup> There will be many kinds of individuals and collectivities of interest. We will specify their roles in the EEVD and delineate the properties according to which they are to be analyzed.

Because the EEVD has such a broad scope, the evaluation plan must be organized so as to provide an up-to-date display of data to be collected in the field. Such a display will be an essential tool for evaluation management and will facilitate checks on the relevance and validity of the data that are collected. Without this management capability, there would be serious risk of (1) the evaluation becoming swamped with data that add little to the description and analysis; (2) misallocation of data collection and data analysis resources; and (3) confusion and misunderstanding in the execution of program analysis tasks.

The evaluation plan must also provide a "decentralized" approach to major evaluation tasks. Specialists representing various professional disciplines must concentrate on the appropriate data collection and analysis tasks in the areas of their professional competence, and their findings must be brought together in an interdisciplinary analysis of aggregate outcomes. This approach to the organization and management

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<sup>\*</sup>Lazarsfeld, Paul F., "Evidence and Inference in Social Research," Daedalus, Fall 1958, pp. 99-130.



of evaluation tasks is dictated by the demonstration's multiple objectives and units of analysis. The diverse data sources, data collection methods, and data analysis techniques will require various professional skills. For this reason, the outcome dimensions of interest to the analysis are set out in this Plan according to the required professional skills, and provision is made for the eventual reaggregation of information on these outcome dimensions for the overall analysis of the demonstration.

In the next section, we present the strategy for a data collection and analysis plan which reflects these design considerations.

### III. DATA COLLECTION AND ANALYSIS

#### INTRODUCTION

This section discusses salient problems of data collection and analysis for each of the outcome dimensions of interest to the evaluation. The discussion is organized into three subsections:

- A. Political/Social Outcome Dimensions
- B. Economic/Cost Outcome Dimensions
- C. Educational Outcome Dimensions

At the end of each subsection, a table summarizes and displays the key indicators, data sources, data collection methods, and data analysis techniques related to each outcome dimension.

Section IV of this Plan discusses the manner in which this information will be reaggregated for program-level analysis.

### III.A. SOCIAL/POLITICAL OUTCOME DIMENSIONS

The social and political outcomes that we will discuss in this subsection will be measured primarily in the context of the community, viewed as a social system containing, among other smaller systems, the school system. While one may analyze any social unit as a "closed" system (concentrating on its internal structures and processes), we have chosen to view both the demonstration community and its schools as open systems -- allowing us to capture both internal system effects and relationships between systems. Indeed, this approach is necessary since the EEVD originates as an intervention from outside the public school system and local community, and is designed explicitly to alter the relationships between citizens and their schools. If changes occur in the relationships of the schools and the community, one may expect that the internal relationships in each system will undergo change as well: citizens of different constituencies may find themselves in different positions and roles relative to one another; school personnel may find their accustomed positions and behavior modified.

Three of our six evaluation issues will be addressed primarily by data from the community context: (1) has the demonstration restructured the relationship between citizens and their schools in a desirable manner? (2) has the demonstration helped to ameliorate or reduce critical social and political tensions? (3) has the demonstration increased equality of educational opportunity? The remaining evaluation issues will be addressed by data from other contexts though inputs from the community sector will be used as appropriate.

For the purpose of the evaluation, the significant groups in the community are the parents, other citizens, school personnel, and students. The most significant variables for analyzing the demonstration outcomes for each of these groups are their experiences (broadly defined to include knowledge), their attitudes, and their behavior. The substance of these major variables (that is, the specific experiences, attitudes, and behaviors we choose to inquire about) is defined by the requirements of those

information categories that are needed to answer the major evaluation questions. Further, we must be able to measure the presence or absence of change, the substance of the change, and the degree of change in these variables over time -- and the relationship of the change process to the intervention of the EEVD. Finally, we must be able to differentiate between outcomes that are intended by the EEVD and those that may be called latent functions or unintended consequences of the demonstration.

#### DATA COLLECTION TECHNIQUES

To carry out these tasks, we plan to use four techniques of data collection: surveys, interviews, examination of public records, and community observation. Although considerable work has been devoted to the development of the survey instruments and sampling design, surveys are not necessarily the primary form of data collection for the measurement of social and political outcomes. (We have spent a considerable portion of our planning effort in developing a baseline survey instrument suited to the needs of the evaluation and the characteristics of the anticipated respondents as described in our submission of February 7, 1972, Survey Research Specifications and Baseline Instruments for EEVD.<sup>\*</sup> In Appendix B we discuss the problems of survey research, the results of the pretest of our draft baseline survey instrument, and their implications for changes in the final survey instrument.)

While surveys provide the most reliable way of acquiring certain types of information (e.g., the attitudes of people that may be expressed in no other medium available to policymakers), they are inefficient ways of acquiring other equally important types of information. Surveys may be used to assess the experiences and opinions of ordinary people in the

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\* On pages 29-30 of this subsection, we discuss revisions to the sampling design submitted in that report.

community who have either marginal or no associations with channels of opinion formation and expression beyond their families and friends. Although organizational leaders are often willing to speak for these people, their responses are not representative. On the other hand, organizational leaders provide insights into the impacts of the demonstration that cannot be acquired through the surveys. These are the people in positions that make them most able to vocalize their opinions in public media, influence and mobilize constituencies, and respond to the demonstration in organized fashion. They are also privy to discussions of the demonstration -- and thus information -- not accessible to ordinary citizens. We thus view the data gathered by means of surveys and those gathered by means of personal interviews as balancing devices in the analysis -- each adding to analysis of the other.

The measurement of people's behavior represents a different type of problem. Since behavior represents overt action, in some instance it may be recorded in public records. We have tried to avoid including behavioral items in the survey instrument that could be acquired more cheaply through an examination of school, voting and other public records. Obviously one cannot eliminate all behavioral items from the survey instruments because (a) some behavior is not recorded anywhere and thus must be acquired in the surveys (for example, parent-child interaction about school), and (b) records do not provide reasons for the behavior which for evaluation purposes may be as important as the behavior itself. (If evidence shows that parents keep their children in accustomed schools because they perceive no differences between schools, the policy implications would be different from those produced by evidence that parents keep their children in accustomed schools because they want their children in schools close to home, whatever the perceived differences among schools.) To be sure, respondent reasons for reported behavior may be consciously or unconsciously misleading. The best guide to analysis in these cases is a comparison of stated reason versus aggregate outcomes in the light of the most important policy questions. For example, large numbers of respondents may express opposition to racially and ethnically segregated schools and may express reasons for school choices and school admissions policies unconnected

to racial/ethnic considerations, but school enrollment records may continue to show segregated schools. Regardless of what people say about their decisions, the outcomes of their decisions are likely to be more important for policy purposes.

The fourth technique for data collection is community observation, which will also provide important kinds of data. Community observation has three merits for the evaluation. First, it is the best way of acquiring an understanding of the patterns of group relationships, community norms, and daily activities that make up the life of the demonstration community. "Still-life" portraits of a community are not adequate to capture the flow of demonstration effects and the range of affected groups. Community observation provides something more akin to a moving picture of a community-in-process. Second, it is one of the most important sources of data and insight into the unintended consequences of the demonstration. It is precisely because we cannot predict these consequences or the groups they may affect that we cannot be certain of eliciting them from the surveys, interviews, and inspection of records. Trained observers who live in the community will often be able to note subtle changes in group participation, group concerns, community norms that may reflect unanticipated demonstration effects. This ability is sometimes referred to as "getting a feel" for the community--a description which inevitably sounds unscientific and ambiguous. However, good community observation works by ground rules which have been developed precisely to translate the inchoate collections of isolated observations by which people make judgments about the "state" of their community into more explicit sets of indices. In short, neighborhoods do have "climates," communities do have "rhythms" of daily life, and personal and group reputations are frequently in a state of constant though subtle flux. Surveys, personal interviews, and official records are simply too selective to "catch" the indices necessary to understand these areas of community life.

The third merit of community observation is its role in providing data which can be used to formulate schedules for more structured face-to-face interviews. The more one knows about the way a community is functioning, the better one knows whom to interview, what questions to ask, and what issues to probe.

One of the tasks in the pre-demonstration period will be to develop a plan for training community observers, followed by the recruitment and training of the observers. This is one of the most important components of the evaluation effort. A training program, yielding people whose data gathering and reporting will be comparable and of consistent high quality, is essential to its success.

Our community observers will be responsible for collecting, organizing, and reporting most of the documentary data about the community. Official statistics, public records, newspapers, organizational records are some typical sources for these data. They will also be responsible for interviewing community leaders and attending appropriate community events and meetings. We plan to recruit and train two community observers for each site, one male and the other female.

#### ANALYSIS OF ATTITUDES AND BEHAVIOR

In the analysis of social and political outcomes, we will be constantly measuring attitudes against behavior within and between relevant groups in the demonstration community. The experience of social science research is discouraging at first glance, for it shows that attitudes are sometimes perfectly congruent with behavior, sometimes opposite to behavior, and are often somewhere in-between these two extremes. This means, in effect, that options to act in accord with one's beliefs and/or preferences are often viewed as too costly. In order to compare attitudes and behavior, we must identify the perceived constraints that carry most weight in people's decisions to act in a particular way. Multivariate analysis of our survey responses will be especially helpful for this task.

The EEVD seeks to change the costs of educational options for parents, creating a new set of options for them. As constraints shift, formerly latent attitudes may become operative. This is why the baseline survey instrument asks parents to choose between options for their childrens' education that are generally unavailable now, but should become available as the demonstration begins. It is also why the evaluation design provides for the detection of unanticipated consequences; as constraints shift in one area of community life, then constraints may also shift in other areas.

Furthermore, attitudes held under known constraints may appear stronger than when the constraints are lifted. In such cases, people may not "follow through" on their expressed interests and desires when the opportunity arises. Indeed, one of the most cherished aspects of freedom may be the ability to assert strong negative feelings about something without feeling obliged to act on these feelings.

In short, the analysis of attitudes and behavior is never simple or straightforward. We have tried here to point out the major analytic pitfalls and the considerations and analysis techniques we will bring to bear in attempting to avoid them.

#### ALTERNATIVE SAMPLING DESIGN

The sampling design which we submitted in Survey Research Specifications and Baseline Survey Instrument for EEVD, February 7, 1972, was developed with priority placed on quality of the results rather than cost. Having made the cost estimates for the initial sample, however, we find that a disproportionate amount of the resources available for the evaluation will be spent for surveys. Thus, as we indicated in our letter of transmittal accompanying the sampling design and draft baseline survey instruments, we are submitting an alternative sampling design that will reduce survey costs to a more realistic proportion of the total evaluation budget in each community.

Our initial design proposes 1300 completed interviews for each survey of parents and other citizens in the demonstration community and 390 completed interviews in the control community. Our alternative design calls for 800 completed interviews for each demonstration community survey and no control community survey. Since we have not varied the interview design in the alternative plan, each cell size is reduced to .615 of the original cell size (800/1300). For each census tract the number of clusters sampled will be reduced by the same proportion.

A sample size of 800 will still detect differences of a reasonable order of magnitude. For example, a random sample of 800 on the proportion of "yes's" on a "yes-no" question brackets the population proportion  $\pm 7\%$  with over .95 confidence. However, to estimate sample sizes necessary to get specified accuracy of a prediction with multivariate regression



models requires an idea of the standard error of prediction -- impossible without some data. This suggests that sample size should be determined sequentially both within each demonstration community and between demonstration communities, as information from one community can be used in planning for another community. While we have used the number 800 for our cost estimates, we strongly recommend that initial baseline data from the first demonstration community be used in determining sample size for subsequent surveys and subsequent communities.

The "control group" in the initial design consisted of a sample from one community near the demonstration community. Each interview is an abbreviated version of the demonstration community instrument. This would allow us to monitor general attitudes toward education affected by national trends in education-related issues (e.g., the Serrano v. Priest decision or other significant changes in the financing of public schools). Even so, the neighboring control community may have its own peculiarities, and our results from that community would be vulnerable to challenge along those lines. The better way to develop "controls" would be to use a relatively large number (say 20) of different control communities with full interviews to a small sample in each community. In this way one could control for community differences but still detect any national or state-wide changes in attitudes toward education which might also affect the demonstration community. However, this method was rejected from the beginning because of its very high cost.

Since the results from one control community are of questionable value, we prefer to eliminate those surveys altogether, given funding constraints. If there is more than one voucher demonstration, other demonstration communities will serve some of the purposes of the neighboring control community and may serve them even better since in these communities the full interview will be administered. However, if OEO prefers to include a separate control community, we are prepared to conduct the survey as described in the Field Research Corporation report.

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#### DATA SOURCES

We intend to acquire data relevant to social and political outcomes from four major groups in the community: parents, other citizens, school

personnel, and students. We now discuss the important classifications within these groups, the particular data collection devices appropriate to each group, and the substantive areas of interest.

### Parents

We will focus on the experiences, attitudes, and responses of five subgroups of parents distinguished by the nature of their relationship to the demonstration:

1. Parents with preschool children
2. Parents with children in K-n (target parents)
3. Parents with children in grades beyond the demonstration
4. Parents holding elective or appointive positions on parent groups or committees active in educational affairs<sup>\*</sup>
5. Parents who use their vouchers to choose different schools for their children.

Respondents to the first three subgroups will be selected in the course of the random probability sampling for the full parent/community survey.

Parents with pre-school children are of interest in comparing the perspectives of "potential" as opposed to "actual" participants in the demonstration. Over time, the effects of their contact with participating cohorts of parents will help to confirm our assessments of the response of participating parents. In addition, baseline data for this group helps correct for the error inherent in recall of the original participants when we need to compare pre-voucher attitudes with those that develop during the demonstration.

Parents with school children beyond an age eligible for the voucher have had extensive experience with the school system. They may provide

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<sup>\*</sup>We are interested in parents who are members of such groups as PTA, executive committees, Parent Advisory Committees for Title I and Follow Through Programs, and other community groups, official or ex officio, active in education. As the demonstration proceeds, parents participating in groups formed in response to the EEVD such as EVA committee or Concerned Mothers group, will be included in the evaluation.

a source of evidence from which some inferences can be drawn about the extent of EEVD influence on parent attitudes and responses. Some parent concerns about schools may simply be a function of the child's development. If changes in target parents' attitudes and responses were due solely to maturation factors, we would expect to find their response becoming more and more like those of parents of older children. Such inferences must be cautious, for numerous factors occurring concurrently with the EEVD, such as Affirmative Action programs, might be producing changes in the post demonstration parents. In later surveys, these parents will have experienced the change from voucher to non-voucher schooling and their response may be significant for policy considerations to extend vouchers to the secondary school system.

Although some parents in the fourth and fifth subgroups are likely to be interviewed in the surveys, we cannot get an adequate representation of either group by this means. Thus, these parents will be interviewed with a much more focused set of questions. Parent committee members have a singular contribution to make to the evaluation: an assessment of the degree to which school personnel respond to parent suggestions and recommendations as a consequence of the demonstration. These parents who act as part of the "official" channels of communication should have an expertise about parent-school relationships unavailable to most parents. Rand personnel will attend their meetings from time to time, interview the officers of these groups, and inspect organizational records (minutes, group proposals, etc.) which they make available to us.

If we could assume that large proportions of parents will change the schools which their children attend in the first year of the demonstration, we could plan to select them in the course of the survey sampling. We do not think, however, that it is wise to make this assumption. Thus, we plan to provide schools with a form (via the Data Management Contractor) which parents would fill out at the time they fill out other forms when changing their child's school. This form will ask them to say if they are willing to be interviewed by a member of the evaluation team. We would then receive from the Data Management Contractor the names of parents who had changed schools and interview the volunteers, primarily concerning their reasons for selecting another school. Their responses

will cast light on EEVD impact on the most active users of the options it provides.

The most pertinent categories of information which we will be acquiring from parents, identified according to their source and functions in the analysis, are explicitly set forth in Table III-1 at the end of this subsection. Here, we want to indicate our major reasons for collecting these particular types of data. In the data specifications we have established priorities on the basis of the major evaluation issues and policy questions that must finally be addressed by the evaluation. In particular, it is essential to find out about parent attitudes and responses toward: (1) the school to which they have access, (2) racial/ethnic integration in the schools, and (3) the operations of the EEVD. We have created baseline measures for these elements which will be continued in the demonstration surveys.

While the information categories, outcome dimensions, and indices relevant to racial/ethnic integration and the operations of the EEVD are fairly straightforward, important distinctions must be made in parent attitudes and responses toward schools. For instance, it is certainly possible for parents to value formal education highly and still be antagonistic to existing schools; also, attitudes toward education may change differently from attitudes toward schools. Indeed, Rand's advisory panel of experts on the EEVD has suggested that we might realistically anticipate the attitudes of poor parents to grow more critical toward the schools precisely as they became more concerned with the education of their children. We have thus maintained a careful analytic distinction between attitudes toward schools and toward education.

#### Other Citizens

The analysis must include people who hold no official positions in the schools and who are unaffected by the demonstration because they neither have nor expect to have children in the schools. While these people may be less interested in certain features of the demonstration, as taxpayers they are part of the constituency of the school system, and can be mobilized around political issues covering the schools. No community is so structured as to prevent exchange between parents and non-parents

or taxpayers and non-taxpayers -- and the flow of information and opinion between these differing groups is of considerable import. For instance, different opinions and responses between EEVD parents and other citizens may emerge. The evaluation cannot decide whose judgments should prevail, but the evaluation may provide data that may be helpful in making such a decision.

We will be examining two subgroups of "other citizens": (1) members of the community selected on a random probability basis, and (2) community leaders -- those persons who hold elective or appointive offices in various civic and community groups, and those who are identified by community members as informal leaders.

Those in the first category will be surveyed each year with an instrument comparable to the parent survey appropriately modified. Their attitudes and responses toward education, schools, and the EEVD are important for the evaluation. Those in the second category will be studied primarily by our community observers since organizations are better studied by observation, inspection of records, and interviews of organization leaders than by surveys. Background data on the community -- descriptions of its demographic characteristics, major organizations, local issues, levels of past political activity -- will help to assess the continuing effects of the demonstration on the community-at-large.

The EEVD effects are not limited to the school system. The EEVD may provide incentives for structural changes within the community, and between non-parents and schools. Structural changes are marked by changes in who participates in the decisionmaking process (e.g., people who represent different income, ethnic groups in the community) changing rules for the decisionmaking process (e.g., voting instead of administrative fiat), and substantive changes in decisions (e.g., different allocations of funds). These types of changes may be accompanied by the development of new constituencies around new issues and shifting group loyalties. Our survey measurement of attitudes and propensities toward political mobilization in the community, careful community observation, and interviews of leaders should allow us to collect the data that will describe important changes in community structure.

### Educational Personnel

Educational personnel will be analyzed in terms of their respective roles in the school system, such as administrators and teachers. Within the administrative category we include: members of the school board, school superintendents, school principals, other administrative staff, and members of the EVA. Within the teaching staff we include fully certified teachers and paraprofessionals.

We also intend to include state and local officials like the County Superintendent of Schools, members of the State Board of Education, the State Superintendent of Instruction, members of the State Department of Education, and representatives of appropriate State legislative committees (e.g., Education, Finance, Ways and Means), as well as appropriate Federal program officers. Teachers' attitudes and responses may be compared with the official positions of their professional organizations -- the National Education Association and teachers' unions.

The social and political outcomes relevant to school personnel are also structural. We want to identify changing participants in the decisionmaking process, changing rules for the decisionmaking process, and substantive changes in decisions. These particular changes are primarily internal to the school system. While the effects may be strongest at the local school level, they must be traced through the system at every administrative level. Indeed, the impetus to change may well originate at administrative levels beyond the local demonstration schools.

Relevant data will come from personal interviews and the examination of school records provided by the Data Management Contractor and the administrators themselves. While we are interested in the attitudes of educational personnel toward the demonstration, we will weight their actions more heavily than their statements. Administrators, especially, are in positions that are political as well as educational and their interview responses will be affected by that fact. Furthermore, they are subject to constraints which may well lead to divergences between their expressed attitudes and their actions. For instance, administrators may want to change the recruiting procedures for teachers but may be prevented by teachers' union regulations. An understanding of these constraints at

each status level of the educational system is best acquired by careful analysis of their audiences -- the people to whom they must answer for decisions that are made.

Teachers and teachers' aides, on the other hand, are in somewhat less "political" positions than their administrators, because their decision space is smaller and less subject to public scrutiny. Their experiences during the EEVD and their attitudes are likely to be the best measure of the operational impacts of the demonstration on the school system. They will have the most continuing contact with changing distributions of students and parents, put into effect any curricular or procedural changes in the classrooms, and provide administrators the basic data for records of classroom functions and problems. If the EEVD increases paperwork, teachers are first to be sensitive to this; if student problems increase, teachers should be the first to recognize this; if parent behavior changes significantly, or their concerns with the school undergo change, teachers should be the first to know.

We will, therefore, interview samples of teachers in each demonstration school, analyzing both their attitudes and experiences with respect to the demonstration and their movements between schools and in and out of the school system. Once again, these data will be compared with the data we acquire through the official channels of teacher opinion -- their organization and unions.

### Students

The assessment of student educational achievement and growth over time is one of the most important issues associated with student experience in the demonstration schools. These data will come from the students themselves (techniques of measurement and data collection are discussed in subsection III-C). Three areas of student response and experience in the course of EEVD are of particular interest:

1. The actual ethnic/racial/income distribution of students in the schools
2. The response of students to schools
3. Experience with parents or significant others in the home which may have impacts on student educational achievement and growth.

Information about ethnic/racial/income distribution of students, will be relatively simple to acquire. The source is school records acquired through the Data Management Contractor. But these distributions are only the last stage in a more complex decision process, which begins with decisions that parents make about where to send their children and decisions that schools make about admissions. Comparisons among actual distributions after school choices are made, distributions announced by the EVA prior to decision time, parent and school personnel assertions about school integration, parent reasons for school choices, and administrative decisions about admissions policies will help us to understand what the distributions mean and will help us to assess the impact of the demonstration on school integration.

We have chosen not to interview students directly for information on student response to schools and their education-related home experiences. The target children are presumably too young to choose schools independently from their parents. At the same time, their responses toward school environments (teachers, subjects, peers, rules) will presumably influence parent choices of schools. Thus during the course of the surveys, we have chosen to elicit parent observations about their children's responses to school and the substance and frequency of their school-related interactions.

These outcomes are more educational than social/political in character. The home environment is of central importance in the affective and cognitive development relevant to school achievement. Many research findings\* emphasize the critical role of parents as they represent the world to

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\* See, for example: Benjamin Bloom, Stability and Change in Human Characteristics, John Wiley, New York, 1964; Bloom, et al., Compensatory Education and Cultural Deprivation, Holt, Rinehart and Winston, New York, 1965; R. Cloward and J. Jones, "Social Class: Educational Attitudes and Participation," 1963, in Education in Depressed Areas, Passow, ed.; R. H. Dave, "The Identification and Measurement of Environmental Process Variables that are Related to Educational Achievement," unpublished Ph.D. dissertation, University of Chicago, 1963; Robert Hess, et al., "The Cognitive Environments of Urban Preschool Children: The Follow-Up Phase," Graduate School of Education, The University of Chicago; Daniel Scheinfeld, "On Developing Developmental Families," paper presented at the Head Start Research Seminar #5, Washington, D.C., January 1969; S. L. Wolf, "The Identification and Measurement of Environmental Process Variables Related to Intelligence," unpublished Ph.D. dissertation, University of Chicago, 1964.



their children, shape expectations and attitudes and provide them with skills. In general, those home and parent factors which have been found to correlate most highly with academic achievement as measured on standardized tests are:

- a. Parental concern and support for achievement and learning
- b. Maternal teaching style
- c. Home resources for general learning.

We are acquiring data primarily on the first two factors which are less class-biased than the third. However, we will only be able to compare aggregate changes in parent-child interaction about school with aggregate changes in student achievement and growth. In order to keep survey data confidential, we will not be able to connect individual student test scores with their parents' survey answers. Actually, it is possible to make these connections and still maintain confidentiality, but this is too expensive a task in light of the amount of evidence generated.

#### CONCLUSION

In the analysis of social and political outcomes of the EEVD, we are viewing the demonstration community and demonstration schools as open, interlocking systems -- having both structural and functional relationships. Within the community system, group effects of the demonstration are expected to vary by the relationship of those groups to the educational process and hence to the demonstration. Within the school system, effects of the demonstration are expected to vary by the relationship of groups to the educational decisionmaking process. As these two systems interact with one another around the focal point of the demonstration, responses are expected to vary in terms of the constraints imposed by special interests, audiences, and norms internal to each system.

The major variables essential to understanding the structures and interactions of these systems are experiences, attitudes, and behavior. The analysis will be an analysis of process -- as changes over time constitute the most critical effects to be identified. Data will thus be collected so that different points in time are integral to the analysis: historical, baseline, first year of the demonstration, second year of the demonstration, and so forth.

The substantive data that we will be collecting -- organized according to outcome dimensions, measurement indices, data sources, data collection devices, data collection responsibility, and preferred forms of data analysis -- are contained in Table III-1.

Table III-1  
SOCIAL AND POLITICAL DATA

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Practitioner assessments of local schools.	Expressed attitudes toward relative merits of own school, local schools, schools elsewhere; judgments of most significant school problems, schools' use of public money. School personnel transfers, reasons for transfer.	School personnel Transfer records	Interviews Inspection of transfer records	RAND, DMC	Descriptive analysis
Educational goals of practitioners.	Expressed attitudes toward importance of education, school vs. parent contribution to education, major aims.	School personnel	Interviews	RAND	Descriptive analysis
Practitioner opinions about school integration.	Local school current student distributions; expressed attitudes toward importance of ethnic/racial identity between students, teachers, administrators; opinions about current distributions of ethnic, racial groups.	School personnel School records	Interviews Inspection of school records	RAND, DMC	Descriptive analysis
Practitioner opinions about EEVD.	Expressed attitudes toward school problems, parent role in schools, alternative special programs in schools; expressed judgments about who benefits most from EEVD.	School personnel	Interviews	RAND	Descriptive analysis
Locus and scope of authority for policy origination, ratification, and implementation for the demonstration area.	Character and impact of policy decisions originated, ratified, and implemented for demonstration area by district school board, EVA, professional organizations, citizen groups, and federal and state legislative and executive bodies.	Records and minutes of District school board, EVA, professional organizations, and citizen's groups Directives, statutes, orders, policy resolutions, and guidelines promulgated by federal and state legislative and executive bodies, District school board, EVA, and other groups (cont'd.)	Inspection of public records Inspection of newspapers Personal interviews	RAND	Political and historical analysis Content analysis

Table III-1 (cont'd)

Political/Social Outcome Dimensions (cont'd.)	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Relationship of the demonstration area to federal, state, and county regulatory and administrative agencies.	Scope and frequency of administrative regulations applying to and promulgated for demonstration area by various agencies.	Records of federal and state legislative hearings and debates Personal recollections	Inspection of public records Personal interviews	RAND	Political and historical analysis Content analysis
Allocation of day-to-day decision making authority in demonstration area.	Level of operational detail for which formal rule-making prerogatives are maintained or assumed by District School Board and/or EVA, District- or area-level professional staffs, building level administrators, teachers, paraprofessionals, citizens' groups, students.	District School Board and EVA records Records and files of District- and area-level professional staffs Records and files of building-level administrators Personal knowledge of District School Board and EVA members, District- and area-level staff, building administrators, teachers, paraprofessionals, citizens Unrecorded decisions, directives, and assumptions of authority by school personnel at various levels of responsibility Classroom, school, and community observation	Inspection of public records, minutes of meetings and files Personal interviews Classroom, school and community observation	RAND	Political and historical analysis Content analysis

Table III-1 (cont'd)

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Administrative organization, practices, and behavior.	School staffing patterns and organization. Responsiveness of demonstration area and school administrators to student needs, parent concerns, and emerging educational issues. [Criteria: ability to identify needs and problems, and understand issues; speed, appropriateness, and effectiveness of response, ability to shift objectives or means in response to new information.]	School records, memoranda, and staff directives Records of demonstration area administration Press accounts Personal views and experiences of demonstration area and school administrators and parents, Students achievement records Discussions and debates among administrators and between parents and administrators. Observed behavior of school and demonstration area administrators.	Inspection of demonstration area and school records and files Inspection of newspapers Personal interviews Surveys School, classroom, and community observation Student achievement tests	RAND/DMC	Political and historical analysis Content analysis Appropriate statistical analyses (survey data)
Legal/constitutional ramifications.	Legal actions associated with EEVD provisions Court ruling-	Court records Newspapers Views of attorneys and parties to legal actions Published court opinions	Inspection of court records and public documents Inspection of newspapers Personal interviews	RAND	Political and legal analysis Content analysis
Position of professional educators in community social system.	Influence on community expenditures, allocations, access to rewards (monetary, community prestige) status prerogatives.	School personnel, community leaders, officials Public records	Interviews Community observation	RAND	Content analysis, descriptive analysis

Table III-1 (cont'd)

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Status prerequisites within school system.	Influence on budget allocations, access to rewards, control of entry to profession, control over rules of school assignment, transfer of salary increments	School personnel, teachers' unions, NEA	Interviews, organization records, school records	RAND/DNC	Descriptive analysis
Ethnic/racial income distribution of students in demonstration schools.	Numbers of students in each ethnic, racial, income group before/after each school choice period; ethnic, racial, income distribution of student transfers.	School records	Inspection of records	RAND/DNC	Descriptive analysis
Parent judgments of educational opportunities for their children.	Expressed attitudes toward: child's response to school, congruence between parent desires for child's education and what schools provide; expressed aspirations/expectations for educational achievement of their children.	Parent respondents Parent groups	Survey Interviews	Field/RAND: RAND	Appropriate scaling and other statistical analysis; descriptive analysis
Parent assessment of local schools.	Expressed attitudes toward: relative merits of child's school, other schools in school district, schools elsewhere; schools in rich neighborhoods versus poor neighborhoods; public versus private information about schools; schools' use of public money, expressed reasons for decisions about child's school.	Parent respondents Parent groups related to schools	Survey Interviews	Field/RAND: RAND	Appropriate scaling and other statistical analysis; descriptive analysis
Parent opinions regarding racial/ethnic integration in the schools.	Expressed attitudes toward the proportion of students, faculty, administrators who should be of the same ethnic background as child; reasons for child's problems in school; reasons for school selections (compared with student teacher ethnic distribution; reasons for mobility).	Parent respondents School records Parent groups related to schools	Survey Interviews Inspection of school records	Field/RAND: RAND DNC	Appropriate scaling and other statistical analysis; descriptive analysis

Table III-1 (cont'd)

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Parent assessments of the EEVD.	Expressed attitudes toward congruence between parents' desired and experienced control over schools, between information about schools desired and provided by EVA, between school preferences and school assignments, between information about schools provided by EVA and parent experiences with those schools; expressed willingness over time to take various actions to influence schools; expressed judgments about who benefits most from EEVD.	Parent respondents Parent groups related to schools	Survey Interviews	Field/RAND; RAND	Appropriate scaling and other statistical analysis; descriptive analysis
Parent participation in the education of their children.	Reported behavior in degree and substance of interaction with child about school, in parent/teacher contact; reported knowledge about child's school and school experience; expressed attitudes about role of parent in education of child.	Parent respondents	Survey	Field/RAND	Appropriate scaling and other statistical analysis
Parent involvement in school-related activities.	Stated participation in school-related organizations, activities, events; in discussions about schools. Reported levels, substantive issues and outcomes of parent efforts to influence schools. Reported level of knowledge about schools in school district and elsewhere.	Parent respondents Minutes of parent meetings School-related parent groups	Survey Interviews Inspection of group minutes, proposals, etc.	Field/RAND; RAND	Appropriate scaling and other statistical analysis; content analysis, descriptive analysis

Table III-1 (cont'd)

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Parent mobility.	Number of parents moving within, into or out of demonstration area and their reasons.	Parent respondents School records	Survey (plus special out-migrant survey) Inspection of school records	Field/RAND; DMC	Descriptive statistics
Parent involvement in FEVD options.	Reasons for decisions regarding children's schools; type of change in selection (e.g., public to private, existing to new, etc.); transfers from school's after initial selection.	Parent respondents School records	Survey Inspection of school records	Field/RAND; DMC	Appropriate statistical analysis: descriptive statistics
Community assessment of local schools.	Expressed attitudes toward relative merits of local schools and schools elsewhere, toward schools in rich versus poor neighborhoods, toward public versus private information about schools; expressed attitudes toward schools' use of public money.	Community respondents Community leaders	Survey Interviews	Field/RAND; RAND	Appropriate statistical analysis
Community attitudes toward education.	Expressed attitudes about the importance of education, congruence between what children should be learning and what schools teach.	Community respondents Community leaders	Survey Interviews	Field/RAND; RAND	Appropriate statistical analysis: descriptive analysis
Community opinions about racial, ethnic integration in the schools.	Expressed attitudes toward what proportion of students, faculty, administrators should be of same ethnic background as children; about most significant problems in community.	Community respondents Community leaders	Survey Interviews	Field/RAND; RAND	Appropriate statistical analysis: descriptive analysis



Table III-1 (cont'd)

Political/Social Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Community assessments of the EEVD.	Expressed attitudes toward congruence between control parents should exercise over schools and control permitted by EEVD; expressed comments about who benefits most from EEVD; expressed opinions for EEVD to continue beyond demonstration period.	Community respondents Community leaders	Survey Interviews	Field/RAND: RAND	Appropriate statistical analysis, descriptive analysis
Community attitudes toward political activism.	Expressed propensity toward political mobilization with respect to schools; expressed judgments about examples of group actions affecting schools.	Community respondents Community leaders	Survey Interviews	Field/RAND: RAND	Appropriate scaling and other statistical analysis; descriptive analysis
Inter-group conflict/cooperation.	Attitudes and positions of group opinion leaders; group public positions on issues; group political activities and affiliations; other group attempts to influence public policies; group activities in schools.	Observed group activities Newspaper accounts of group activities Minutes and records of group and public meetings Personal observations of group leaders, school administrators, EVA members, and other decisionmakers	Inspection of public and group records and files; of newspapers Personal interviews Community observation	RAND	Political and historical analysis Content analysis
Political and social participation.	Voting rates Volunteer political and campaign activity Group membership and activity levels Direct participation in school affairs Volunteer school-related activities	Voting records Records and minutes of political and service organizations and groups Personal knowledge of community members Personal knowledge of organizational and group leaders Observed behaviour of community members (cont'd.)	Inspection of records, minutes, newspapers Personal interviews Surveys Community observation	RAND: Field/RAND	Political and historical analysis Content analysis Appropriate statistical analysis (surveys)

Table III-1 (cont'd)

Political/Social Outcome Dimensions (cont'd.)	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
		Minutes and records of public meetings Press accounts Personal knowledge of school personnel			
Political mobilization.	Formation of new groups or coalitions around EEVD-related issues Activation and/or expansion of existing organizations around EEVD-related issues. Emergence of new political leadership around EEVD-related issues	Observed behavior of groups and group leaders Records and minutes of group and public meetings Views of community leaders, respondents Press accounts	Community observation Personal interviews Surveys Inspection of public and organizational records, newspapers	RAND; Field/RAND	Content analysis Appropriate statistical analysis (surveys) Political and historical analysis
Voting behavior on key issues (increased locally funded expenditures for education, availability of public funds to parochial schools, integration and related issues, provision of new incentives to entrepreneurs).	Votes on education-related ballot measures Election outcomes for political candidates identified with various issues	Voting records, by precinct views of community leaders Views of community respondents	Inspection of voting records Personal interviews Public opinion polls Surveys	RAND; Field/RAND	Political and historical analysis Content analysis Appropriate statistical analysis (surveys)
Political mobilization beyond demonstration area.	Voting behavior on social and political issues; organizational activity aimed at reform of other community problems, at educational reform in non-demonstration schools; emergence of issues such as vouchers for other public services.	Community leaders, officials Voting records School administrators	Interviews Inspection of records Community observation	RAND	Descriptive analysis

### III.B. ECONOMIC/COST OUTCOME DIMENSIONS

#### PUBLIC POLICY ISSUES

The broad economic question underlying the EEVD is whether vouchers will generate broadened and improved educational options for disadvantaged families. This issue can be disaggregated into three general issues:

- o What will be the impact of the EEVD on diversity and innovation in schools?
- o What will be the response to vouchers by public and private school administrators?
- o What will be the impact of the EEVD on school finances?

These questions involve instructional, political and sociological considerations in addition to their economic aspects. Recognizing the overlaps, this section will concentrate on analysis that is directly related to the issue of the impact the EEVD has on the supply and distribution of educational services.

The EEVD envisions a major reorganization of the educational marketplace in each demonstration site. Conceivably the EEVD could lead to the creation of a sizable and economically viable set of private organizations offering educational services. This is, however, neither a primary goal nor a necessary condition for success of the EEVD. The relevant economic goal of the EEVD is an improvement in parental ("consumer") satisfaction. This might come about from an increase in the number of school options, particularly options offered by profit-seeking entrepreneurs or non-profit community organizations. However, improved parental satisfaction might also come because public school officials perceive the need under a voucher system to adapt and provide a broader range of schooling alternatives and/or improved educational processes and outcomes. Thus, the EEVD could be successful in achieving its objectives even if there were no new entry nor the establishment of any viable private schools.

In this connection it should be pointed out that in a voucher system, the voucher itself is not an end but merely the means to get the crucial element, a supply response. This supply response may be in the form of

entry into the market of new entrepreneurs offering preferred schooling options. Other responses are possible as well, however, including the adaption of existing public schools. The crucial issue is that parents have meaningful choices and schools that cannot attract parental support suffer for their failure to do so.

In the following discussion "entrepreneur," "new supplier" and like terms are not limited to the classic businessman seeking to maximize his income. The entrepreneur might well be in charge of a non-profit organization sponsored by a community group or eleemosynary organization. The motive for entry would not be profit-maximization but some form of public or group service. From the standpoint of economic analysis, however, there is no formal difference between the profit-seeking firm and the non-profit organization in this sense. The latter has to cover at least some costs. Unlike the private firm it might not demand a probable positive profit before it would provide educational services; the sponsoring agency might merely demand that it break even or it might be willing to provide a subsidy. However, if we treat profit as a variable that can take a positive value or be zero (break even) or negative (subsidy), then we can treat all potential suppliers of educational services in the same fashion. The only difference is that when we ask whether a given organization is economically viable we have to know whether it is a private firm that demands some positive profit (and how much it requires), or some other organization that is willing to accept a break-even or subsidy situation. In the latter case we have to know how much subsidy the sponsor is willing to provide.

#### Educational Diversity and Innovation

The EEVD seeks two supply responses: (1) new entrepreneurs may enter the education sector and offer parents, particularly disadvantaged parents, schooling opportunities not presently available to them; (2) existing public and private schools may diversify their offerings in order to compete or to forestall entry. Under the EEVD, these new or revised educational programs must be provided at an average cost per school no greater than the value of the regular and/or compensatory voucher multiplied by the number of students.

Vouchers are also intended to generate an increased propensity for educational innovation. We distinguish between diversification and innovation. Diversity might come about by schools offering different but well-known instructional systems. Innovation implies a change in the state of the educational art.

There is an organizational implication to more diversity and innovation. In order to be responsive to the new demands created by vouchers, schools may have to delegate more authority and responsibility to principals and teachers, leading to higher status and responsibilities for them.

Critics of vouchers believe the EEVD will have adverse impacts on the number, diversity and innovativeness of schools. First, they challenge the idea that there are new and superior educational programs available at the price of the EEVD vouchers. They argue that the superior technology does not exist, except, perhaps, at higher per pupil costs than vouchers would pay for.

Second, vouchers may decrease diversity rather than increase it. Each individual school might become more specialized and homogeneous so that while there was diversity among schools, within schools students would be limited in the choice of programs. Also, if they do not have to serve everyone, schools might concentrate on students from certain social or economic groups and ignore the needs of various other types of students.

The third and most significant concern is that diversity and innovations resulting from the EEVD might lower the quality of education. Put differently, there is a concern that the profit motive is completely or partly inconsistent with socially desirable motives for supplying educational services. There are several aspects to this concern. One is concern that vouchers would stimulate the entry into the economic sector of "hucksters" who would prey upon the lack of knowledge of parents about education in order to perpetrate fraud and shoddy marketing practices. Or vouchers might lower the quality of education offered by the existing schools. Voucher systems could "deprofessionalize" teaching by removing credential requirements, destroying the present self-governance system, or

hindering attempts to attract able professionals into the education profession. Other critics reason that the EEVD would create such unbearable administrative and planning problems for school administrators that they would "give up" and simply become "schools of last resort" for those children that private schools choose not to serve. Finally, many worry diversity might take the form of splitting the community into small sectarian, political or racial groups for schooling purposes. Schools would become politicized or partisan.

Both the hopes and the fears surrounding the EEVD represent conceivable outcomes. The positive outcomes can be predicted from the theory of markets assuming that:

- o Parents have substantial and accurate information about schools or they can obtain this information relatively easily and inexpensively.
- o There is a stock of unused educational technology or the state of the art can be substantially improved if there is a demand for new programs.
- o Educational costs and economies of scale are such that preferred or superior programs can be delivered at costs equal to the value of vouchers.
- o Educational entrepreneurs will face a low degree of uncertainty about parental demands and the expected rate of return on their investments.

However, market theory predicts adverse outcomes under the assumptions that:

- o Parents lack essential information about schools and the quality of educational processes and outcomes and the required information can only be obtained at considerable financial or other costs.
- o No stock of unused but superior educational technology exists.
- o There are significant cost economies-of-scale in education.
- o There are strong political, religious or ideological components involved in educational desires of parents.

No a priori judgment can be made about what set of assumptions is more realistic, so the impact of the EEVD on the number, diversity and innovativeness of schools cannot be predicted in advance. The Analysis and Survey Contractor must give close attention to these issues. Specific questions that must receive special study are:

- o Will the educational offerings available to any specific family increase or decrease in number and diversity?
- o Will the rate of educational innovation increase or decrease?
- o Will parents have more relevant information about schools or will there be increased "hucksterism" and "fraud"?
- o Will there be partisan indoctrination?
- o Will the EEVD alleviate or increase administrative burdens?
- o Will the EEVD increase the scope of authority and professional freedom of teachers or will there be a decline in teaching professionalism?
- o Will the EEVD lead to more or less attention to specialized educational needs such as students with physical, mental, or home background handicaps on the one hand, or intellectually gifted or artistic children on the other?

#### Response of Suppliers of Education

Will vouchers generate the entrepreneurial and administrative incentives envisioned by designers of the EEVD? The theory of vouchers holds that placing public funds for schooling in the hands of parents would create a demand for new and diverse types of schools that will be sufficient to elicit entrepreneurial response. Private entrepreneurs will set up new schooling alternatives. Public school officials will be more inclined to provide the educational processes that parents desire and be more concerned about achievement.\* This implies that authority and control within school systems will become more decentralized so that the local principal could serve the special needs of his neighborhood.

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\* Proponents argue that these would be substantive changes and programs, not mere cosmetic or advertising efforts; opponents argue the opposite.

For both propositions, the new incentives are assumed to benefit poor and minority groups especially. The special education needs of these groups, it is argued, tend to be ignored due to existing economic and political incentives.

But, there are grounds to question whether these new incentives would be sufficient to induce the desired behavioral response. There are important questions about the availability of new technology and the costs of delivering new or superior programs to students. Some even argue that the incentives are perverse and will lead to undesirable entry into the educational marketplace of shysters and hucksters. Put differently, there is a concern that the goal of obtaining profits is inconsistent with the socially desired educational objectives.

For that matter, the behavioral impacts on public school officials might be adverse rather than positive. If the public schools become "schools of last resort," principals and other school officials may become apathetic and nonresponsive because their students would have no place else to go.

These issues can be studied by examining four specific questions:

- o Will private entrepreneurs in charge either of for-profit firms or nonprofit organizations enter the school marketplace? If so, what will be the nature of their offerings?
- o Will there be a decentralization of responsibility for curricula, educational process and educational emphasis in public school systems?
- o Will public school systems become more responsive to parents or become limited to a "captive" student body that other schools do not want, and therefore unresponsive to their clients?
- o Can an economically viable private school sector exist charging tuition equal to the value of vouchers? What will be the motives for nonprofit organizations that enter the marketplace? What will be the nonprofit groups' financial requirements considering possible subsidies from sponsors or ability to operate without profit?



### Impact on School Finance

Some have argued that vouchers might be a means of responding to Serrano v. Priest and similar decisions requiring reform of school finance. Others have argued that vouchers might be a legally and politically feasible method for maintaining parochial schools. But there are those who doubt parochial schools will subject themselves to voucher regulations. More generally, voucher proponents argue that the increased parental control over their children's education will lead to increased public willingness to finance schools.

On the other side it is argued: that vouchers would increase the public cost of education by providing public funds for private schools, particularly parochial schools; that vouchers will increase administrative costs and result in losses of economies of scale and so lead to higher average costs; that the result would be to divert parental interest and funds from the educational sector to other sectors, and within the educational sector, to divert funds away from the poor to the education of the affluent.

In short, it can logically be argued that the EEVD will ameliorate the current school finance crisis or that it will exacerbate the crisis. To deal with this topic, the ASC will have to address four basic questions:

- o Will the EEVD increase or decrease educational costs?
- o Will the EEVD increase or decrease financial support for education?
- o Will the EEVD affect parochial school financing?
- o Will funds be shifted from the education of poor students in favor of the education of more affluent students?

### EVALUATION METHODOLOGY

Rand will analyze the supply response to the EEVD by using industrial organization methods as the framework for analysis. Educational program and resource analysis at the school site level will also be employed to

analyze the causal determinants of the supply response behavior as measured by changes in program offerings, changes in resource allocation patterns and changes in school finances.

The essence of the industrial organization analytic approach is that marketplace phenomena are divided into three categories: structure, behavior and performance variables. The causal chain, following economic theory, is that the structural conditions of the market determine entrepreneurial behavior which in turn determines how well the market performs as measured by various indices. The relationships among variables in the three classes, however, can take various forms.

To depart from the specifics of education and look at markets generally, a market structure characterized by a large number of suppliers each with a small fraction of total sales will tend to lead to competitive behavior or entrepreneurial conduct and the performance of the market will be characterized by low prices, non-excessive profits, low selling costs and a desirable rate of capital investment. Conversely, markets with small numbers of sellers typically evidence explicit entrepreneurial collusion or implicit agreements to "live-and-let-live" or "follow-the-leader." These behavioral policies in turn frequently lead to socially undesirable prices, profits, selling costs and investment. Industrial organization theory provides paradigms of different structural, behavioral, and performance combinations. These models are helpful in organizing research, but there are so many alternative relationships possible among the various aspects of a market that careful empirical study and thoughtful analysis is required to delineate the actual causal relationships that apply in any specific market. For the EEVD, where social and political motivations will likely play important roles in addition to the desire for financial gain, it will be especially important to analyze causal relationships among structural, behavioral and performance variables.

Market structure refers to the organizational characteristics of the market. Structure usually is affected only marginally by the participants in the market and is less volatile than behavior or performance. Market structure characteristics generally determine actions of entrepreneurs rather than vice versa. The EEVD can be conceived of as a significant,

discrete change in one important structural condition, the demand function.

The structural variables that are important for the analysis of the EEVD are:

- o Nature of the demand for educational services
- o Number of schools available to different categories of parents
- o Differences in the educational offerings of schools ("product differentiation")
  - locational differences
  - curriculum differences
  - educational process differences
  - "public," "private" and "parochial" characteristics
  - political, religious or social differences
- o The "barriers to entry" of new schools or to school change
  - degree of autonomy of local public schools to respond to changes in market demands
  - start-up and capital costs
  - operating costs--economies of scale and economies of plant utilization
  - legal requirements for entry or change

Market behavior or market conduct refers to the policies and procedures used by buyers or sellers to adapt or adjust to the market changes. In the EEVD context the buyers will be parents and the ASC will need to know:

- o What parents know about schools
- o What parents (buyers) want to know for decisionmaking purposes
- o What criteria parents use to select schools
- o How much control parents want over decisions about their children's schooling.

On the supplier side--the private and public schools in the relevant areas--the analysis will cover:

- o Investment policies
- o Tuition and other price policies
- o Admission policies

- o Policies with respect to determining curriculum, educational processes, emphasis and other elements of the "product" offered.

The analysis will also have to be concerned with how these policies were determined. Do schools simply use tradition-based policies? Is there collusion among educators? Is there an independent, rivalistic posture? Who makes policies? How centralized or decentralized are the decisions? How do the rules of the EEVD actually affect tuition and admission policies?

Performance variables measure how efficiently a market is meeting consumer demands. The pertinent variables are:

- o Prices, cost margins and profit rates on investment
- o Promotion expenditures
- o Rates of innovation and curriculum change
- o Nature and range of the products offered
- o Nature and range of perceived student outcomes (See subsections III.C., below)
- o Entry into and exit from the market.

None of the variables -- including the structural variables -- are likely to remain completely fixed over the duration of the demonstration. The pattern of consumer demands for education is likely to shift, rules of behavior may well shift from traditional rules of thumb to collusion or rivalistic conduct, profit patterns may change and there will be a changing time pattern of values for most of the other variables. The greatest analytical interest will be in the changes in the structural variables of the market.

### Structural Variables

Demand Patterns. The structure of parent (consumer) demands for educational services specifies a set of constraints on any school official's behavior. Private profit-seeking entrepreneurs cannot be expected to offer schooling opportunities that parents do not desire nor schooling opportunities that cost more than parents are willing or able to pay. The same principle applies to public schools required to support themselves with voucher

revenues. Non-profit, sponsored schools might be able to run at a loss, but even here there is some subsidy that will exceed the interest or financial resources of the sponsor. Thus the demand function is, under a voucher system, a basic constraint on profit-seeking, non-profit and public schools alike.

The pattern of demand also provides a normative standard against which to measure market performance. If entrepreneurs are not providing the type of products people want, the market has failed.

As noted previously, demands may well change during the EEVD as parents gain more experience in making choices among alternative schools. Any such changes and the interactions between demand changes and supply responses are very significant subjects for analysis.

The basic technique for measuring parental demands and changes therein is the parent/community surveys described above, supplemented with observational data such as the schooling preferences revealed when parents actually make choices.

Actual choices may differ from stated preferences and, in that case, will be the subject of further observation and analysis.

Number of schools available. A basic set of data is the number of schools available, the number of students they can each accommodate and the extent to which they are operationally and personally acceptable schooling options for different classes of students. An increase in the number of true alternative schooling options would be an important favorable outcome of the EEVD. A school in a given locality may not be a meaningful option to a parent because of its location or some implicit requirement or "image." Survey data plus some informal observations and interviews will likely be required to determine the correspondence between the set of all schools and the set of feasible options for each identified group of parents.

Differences among product offerings. Schools do not offer identical curricula and services. The EEVD is an attempt to increase diversity. There are two economic aspects to these differences in school "product."

On the one hand, diversity among schools may reflect a response to disparities among parental demands and student needs. On the other hand, a firm can insulate itself from competitive forces by convincing customers that its products are not like those of other firms.

The analytic task is to determine: (1) what are the differences among the schools? (2) do these differences reflect underlying differences in advertising "images," (3) do the differences reflect responses to disparate parental demands or attempts to limit competition through market segmentation? The first subtask is relatively easy and can be answered by developing educational offerings profiles through observation and interviews at different schools. The last two subtasks are progressively more difficult, requiring examination of "advertising" techniques, observation of the technology used and consideration of parental answers to the surveys.

Barriers to entry. The supply response will depend upon restrictions to entry in the educational marketplace, or, as it is sometimes called, the heights of the barriers to entry. For the adapting public school the major barrier will be obtaining the authority needed to respond to market signals. Few principals have this authority now and can help establish whether changes in this barrier take place. There are likely to be three significant obstacles to private entrepreneurs:

- o Legal requirements such as teacher certifications, curriculum requirements and the like may restrict supply response.
- o Entrepreneurs must expect to amortize start-up costs and must be able to obtain access to capital markets; the higher these costs the greater the barriers to entry.
- o In order to enter the market effectively, the economies of scale and of plant utilization must be such that the new schools can operate profitably at the voucher price.

Data on these barriers can be obtained by interview and by cost information generated by the Program and Resource Analysis.

The individual school is the focal point for the Program and Resource Analysis. Aggregative data for the individual schools will provide the

basis for assessing the impact of the EEVD on the flow of dollars to education within the boundary of the demonstration.

The Resource Analysis Plan is designed to provide (1) a description of the baseline resource allocation by school within each demonstration area, (2) estimates of the resource impact and the dollar cost of changes in the educational programs for several levels -- subject, grade, school and district and (3) a picture of changes in the dollar flows, both revenues and expenditures, within the district.

The Resource Analysis Plan views schools as organizational entities that use resources in different mixes to produce instructional and other educative programs. These programs are regarded as an intermediate product with student performance as a final outcome.\* The approach can be illustrated as follows:

<u>Resources</u>	<u>Combine to Yield</u> →	<u>Programs</u>
Students	Instructional Strategy →	Curricular
Staff		(Subject)
Facilities	(Conventional classroom)	(Lesson plan)
Equipment	(Open classroom)	Non-curricular
Materials	(Individualized instruction)	(School activities)
Supplies	(Team teaching)	(Extra-school activities)
Services	(Other strategies)	/

The instructional strategy is the process by which resources are converted into program outputs. Particular attention will be paid to defining processes and to determining the extent to which the identified process for any program is adhered to in conducting the program of instruction.

For each school within the demonstration boundary, the programmatic output will be determined. For grades 1 through 6, the estimated time allocated to each "program" will be determined in the manner shown in Fig. III-1.

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\* The methodology to be used is described in S. A. Haggart, Program Cost Analysis in Educational Planning, The Rand Corporation, P-4744, December 1971 and also in Appendix C of this report. A planning cost model for educational programs that will be useful in the early stages of organizing the resource information for the analysis of the supply response is also described.

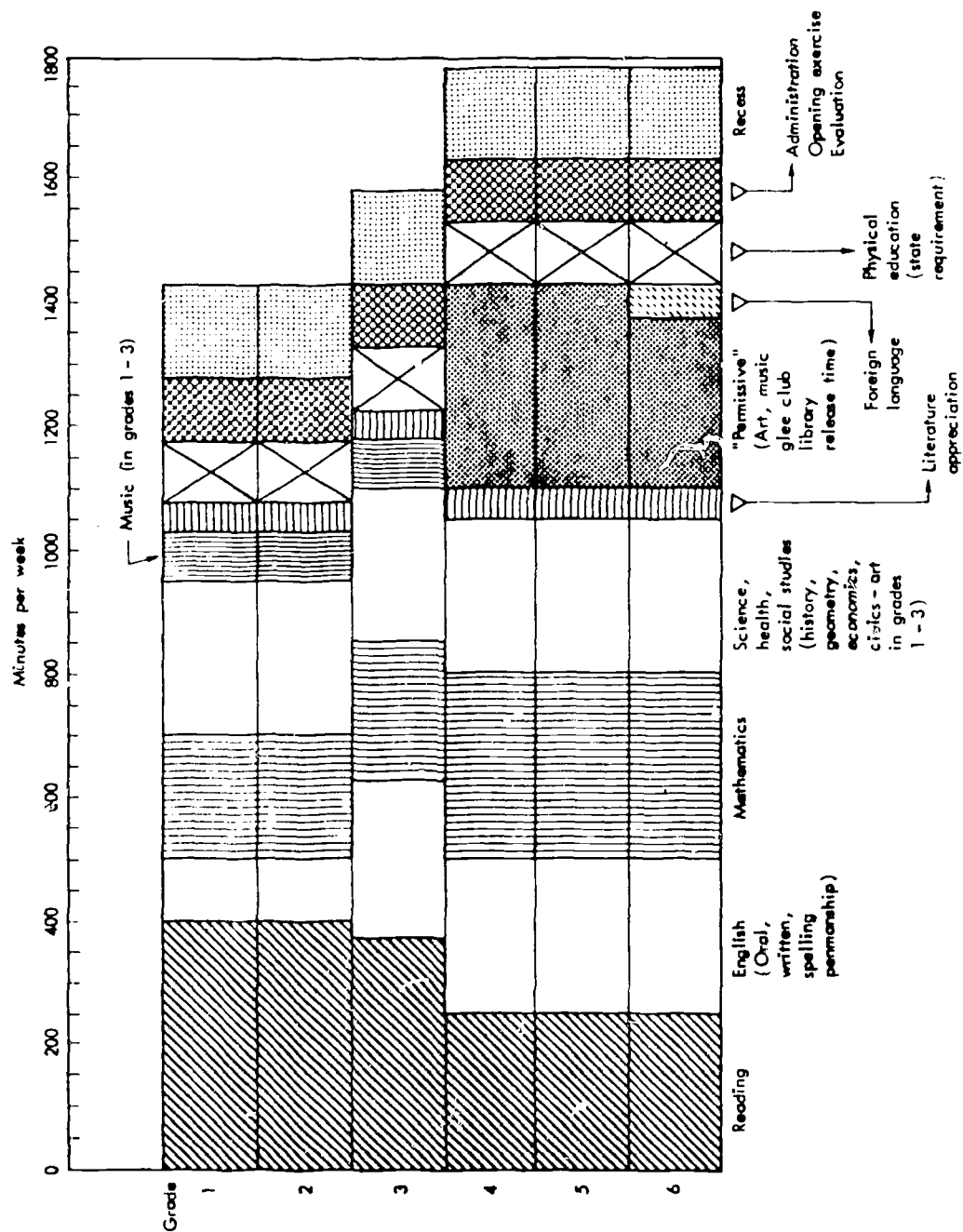


Fig. III-1-1—Time allocation format for grades 1 through 6



For grades 7 and 8, where there is a matching of the programs with the more discrete subject-related periods, the schedule of classes will be used. The resulting program description of the output of each school will be analyzed in terms of its resource requirements and dollar cost. The program and resource analysis will be used. The resulting program description of the output of each school will be analyzed in terms of its resource requirements and dollar cost. The program and resource analysis will be conducted each year of the EEVD so that changes can be tracked.

In assessing the fiscal impact of the EEVD within the demonstration boundary, a model developed for the California State Department of Education will be used to "crosswalk" the budget as presented in traditional format to a program budget. An example is shown in Fig. III-2; the numbers across the top represent the traditional budget category classes. The categories for a program budget are listed down the left side of the table. The model also permits the estimation of the cost of all educational programs offered by the suppliers of education. The major inputs are: number of students, material and equipment costs; salary and wage schedule for staff; class size; (all of the proceedings are by subject and grade); para-professional hours per class-hour; student attrition; and teacher-equivalent hours per week.

The basic data required are:

- o Schools -- Number, size, space, usage
- o Students -- Enrollment, by grade, class, socioeconomic status, mobility
- o Teachers -- Number, salary, training, turnover, transfers  
Class load, extra-curricular activities
- o Equipment and materials -- Available resources, usage, program requirements
- o Programs -- Activity output
- o Revenues -- Revenues and sources
- o Expenditures -- Budget and expenditures by school
- o School factors -- Administrators per staff member, clerks per administrator, etc.

Program	Program cost by budget category																								n
	211	212																							
Instructional program																									
Reading																									
English																									
Mathematics																									
Social science																									
Fine arts																									
Health																									
Physical education																									
Other																									
Instructional support																									
Instructional administration																									
Instructional media																									
Pupil services																									
Attendance and welfare																									
Health																									
Guidance and counseling																									
Food service																									
Transportation																									
General support																									
Maintenance																									
Operations																									
School administration																									
District administration																									
Community services																									

Fig. III -2 — Crosswalk of traditional budget to program budget

### Market Behavior Variables

Parental behavior. The key issues here are the decision rules used by parents and parents' informational base and schooling desires. Such information will be obtained by the surveys and data collected by the ISC and EVA.

Private profit-seeking and nonprofit entrepreneurs. The key issues are how suppliers determine investment, price and product decisions and their admission or "marketing" policies. The differences among the motivations and incentives for profit-seeking, schools, non-profit organizations and units of the established public school system will be investigated. Required data will be obtained by interviews.

Public school officials. The key issues are how public school officials determine the products they offer, how decisions are made, and which officials actually make them. Such data will have to be obtained by interviews.

### Performance Variables

Parental (consumer) satisfaction. The ultimate test of the performance of any market is its ability to satisfy consumer demands. This criterion is particularly important for educational markets in general and the EEVD in particular. To reemphasize a point discussed earlier, the success of the demonstration does not depend necessarily upon the success of new schools but rather, in part, on the ability of the demonstration to increase the satisfaction of parents with the education their children receive however this is accomplished.

In most industrial organization studies, change in consumer satisfaction is measured indirectly. It is inferred from other variables such as shifts in sales from one firm to another or changes in costs, prices or profits. In the markets involved in the EEVD consumer satisfaction will be examined directly by means of periodic surveys of parents.

It is conceivable that in any site-community the established schools might react to new competition or react to forestall the entry of new competitors by becoming more responsive to parental demands, adapting programs or in other ways attempting to increase parental pleasure with the existing schools. Thus, it is possible that market performance as measured by the expressed attitudes of parents could increase without any change in the number or ownership/sponsorship of schools in the community.

Price-cost margins and return on investment. As just discussed, market performance could improve without any change in the number or type of schools in the community. The important requirement is that competition or the threat of competition be a credible force in the minds of school officials. The ability of parents to shift their children among the existing schools may be sufficient to establish this credibility. Competition, however, may require or may be improved by the existence of a group of new profit-seeking or nonprofit schools. If such a group of schools is established it will be vital to examine their economic viability and competitive potential. The key variables here are the price-cost margin and the rate of return earned on investment.\* Competition, if it is effective and viable, will lead to low price-cost margins but also to competitive rates of return on investments. If the price-cost margin is negative or very low or the return on investment is less than that that can be earned in other fields, firms can be expected to leave the field. If the price-cost margin is high or there is a supra-normal rate of return on investment, entry of new supplies will occur. Thus, the price-cost margin and the return on investment are tests of how well competition is working and also a basis for forecasting future entry and exit of schools.

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\* As noted above, for sponsored nonprofit firms these could be negative and the school might still be a viable and effective competitor.

The return on the investment of investors in private schools has a special importance for the analysis of the effect of the EEVD on the educational marketplace. A major question about the demonstration is whether an economically viable set of schooling alternatives can be developed within the financial constraints of the EEVD and EVA. Some observers doubt that the value of the vouchers established by the EVA will be sufficient to support an educational sector with a variety of schooling alternatives. Therefore, it is vital to be able to answer the question of whether the schools that operate during the EEVD appear in sufficient economic health that they can be expected to continue.

A profit-seeking firm will require a positive margin between tuition and costs if it is to survive. A nonprofit firm may, if its sponsors will provide a subsidy, survive although it runs a deficit. Under the EEVD rules a school in the existing public school system must rely on voucher receipts to cover its costs but it does not require a positive profit to be viable. Thus, it is possible that there could be a competitive set of public schools that seek merely to cover costs, a set of sponsored nonprofit schools that seek merely to cover non-subsidized costs and a set of profit-seeking firms that seek revenues greater than costs. If all three groups can achieve their goals under the voucher system, there will be a highly competitive situation. If price-cost margins will not be attractive to profit-seeking firms, then the issue of required or likely subsidies for non-profit schools becomes an important consideration. Also important in this context is the extent and efficacy of competition among units of the public school system.

If the profit-seeking schools turn out to be economically prosperous, the Analysis and Survey Contractor should then investigate whether the profits earned by these schools are excessive. It is conceivable that the EEVD could provide a windfall for private schools. Even if the nominal profits are not excessive, the ASC should go further and look at salaries and expenses. The nominal profits shown on formal balance sheets may be low or negative but the owners may be taking the profits in the form of excessive salaries or perquisites.

For the basic analysis of rates of return on investment, profits and the viability of schools Rand will rely on data generated by the Program and Resource Analysis described above. This analysis will be reenforced, checked and supplemented by interviews with officials of the schools in the district. In addition Rand will also use the data collected by the EVA in its financial analysis of the schools.

Promotion costs. Informing the public of one's offerings is a necessary part of conducting a school, whether the school is profit-seeking, nonprofit, or public. The cost of informing the public of one's product is a necessary business expense but exceptionally high sales promotion costs indicate that competitive rivalry among firms is taking the form of advertising wars rather than price reductions or product improvements. The prior discussion of data sources applies here.

Rates of innovation and curriculum changes. Competition is supposed to stimulate responsiveness and change and this is a major goal of the EEVD. Measuring innovation and change is never easy. Significant changes or innovations have to be distinguished from trivial or cosmetic changes. Moreover, the numerical scale and weighting system for innovation and process change is not obvious. The ASC must make sufficient classroom and other observations to have an understanding of the evidence generated by objective measures of process change.

Rand proposes a straightforward approach to the measurement problem. The existing set of processes will be specified prior to the distribution of vouchers. Then a tabulation of the number and type of educational process and policy changes and the number of actual and potential students affected will be maintained.

Nature of the product offered. A basic issue is whether schools are providing the services desired or whether by collusion, tradition or nonawareness students have Hobson's Choice and have to take what schools offer. The basic technique used will be comparison of parent survey data and the data on schooling options.

Entry into and exit from the market. The EEVD assumes that the "invisible hand" will work to attract entrepreneurs of either profit-seeking

firms or non-profit organizations and public officials who can offer schooling options preferred by the public and that those offering less preferred options will have to change their products or leave the educational sector. Entry into and exit from the market, and the reasons for such decisions, will be monitored through personal interviews.

The significance of a new school entrepreneur entering the market is obvious. The significance of a school entrepreneur leaving the market because of lack of financial support is harder to interpret. For purposes of the EEVD, exit due to financial difficulty is not necessarily a negative outcome. One of the basic ideas behind the EEVD is that schools should be accountable to parents and the wider community and schools that cannot attract the financial support of parents should leave the educational sector. Exit, therefore, may indicate that the EEVD was successful in achieving its goals.

Exit, however, may indicate that schools cannot operate charging a tuition equal to the value of vouchers. This interpretation would call into question the design of the demonstration.

Exit, moreover, may reflect neither lack of parental support nor an inadequate relationship between necessary costs and the value of vouchers. Exit may merely reflect some factor irrelevant to the EEVD such as illness of the headmaster.

Considering that the EEVD will last only five to seven years and that new schools may not be immediately established, if they are established at all, there may be no exits to observe. Lack of exit for reasons discussed previously is not a measure of EEVD failure. But if exit should occur it will be important to interview the school personnel involved as well as parents and analyze the program and financial conditions of the school. Only with such data can the necessary interpretations be obtained.

#### Timing of Changes

The economic theory of markets that underlies the design of the EEVD is essentially timeless; all changes and responses are assumed

to take place instantaneously. In real markets, however, changes, adaptations and responses have a time dimension. The information available for decisions is not immediately available but must be obtained; uncertainties attend every decision and decisionmakers may wait until time clarifies the situation. Therefore, for every change in the structure of the market, or in the behavior of parents of school officials (profit-seeking, nonprofit, or public) it is important to know:

- o Why did the change occur when it did rather than earlier or later?
- o What were the antecedents of the change? Would these always have to precede a change?
- o What information requirements were involved in the change?
- o What were the uncertainties involved in the decisions that brought about the changes?

The data to answer these questions will vary with the change or decision to be investigated and so cannot be specified at this time. Important data sources, however, will be the surveys and the interviews with those participating in the demonstration.

#### Adverse Outcomes

The question of whether the EEVD achieves its positive objectives is most important. But it is also important to investigate unintended negative impacts. Of the various possible adverse outcomes discussed above it seems worthwhile to accord special attention to two of them. The first is "hucksterism" or the possibility of fraud and exploitation of parental ignorance.\* Rand proposes to check carefully on this possibility through its parental surveys and through its analyses of curricula and educational programs. The second adverse outcome is the possibility that

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\* Alternatively, one can ask whether economic incentives are compatible with school quality and educational needs and objectives.



product diversity will take the form of ideological, sectarian, racial or social-class specialization. An increase in social fragmentation or a decrease in educational concern for handicapped children or students with other special needs would be a disturbing consequence and requires careful investigation.

Note that financial failure of schools is not listed as an adverse outcome. As noted above, exit of schools in some cases might be an index of EEVD success. A large number of exits by schools with popular programs might, however, indicate an EEVD design problem and this possibility must be evaluated.

#### Data Requirements and Analytical Techniques

The basic EEVD outcomes to be investigated, the data requirements and the preferred analytical techniques are shown in Table III-2. This table and the preceding discussion assumes (1) a program of non-intrusive Rand interviews in each participating site; (2) an ISC system capable of providing detailed and reliable data about educational programs and costs. If it is not possible to obtain interview data and Rand has to rely on data generated as adjuncts to other parts of the program, the economic analyses cannot be as thorough or quantitative in nature. The resulting reports would generally be limited to descriptions of structural changes with little analysis of the reasons for these changes and what they might imply for other applications of the voucher system.

Table III-2

ECONOMIC AND COST DATA

Economic and Cost Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Structural changes in Educational Marketplace	Demand changes	Parent responses	Surveys	RAND/FRC	Statistical tabulations
	Changes in a number of feasible schooling options	Parent responses Observations	Surveys Observations	RAND/FRC ISC & RAND	Historical and descriptive analyses
	Product diversity and differentiation	School reports to ISA on curriculum, etc. School observation Interviews with school officials	See data sources	RAND	Curriculum content analysis Historical and descriptive analyses
	Changes in barriers to entry	Cost data  Legal codes and regulations Public school organization and distribution of authority rules	Interviews ISA records  Interviews Interviews	ISC & RAND  RAND RAND	Statistical cost analyses  Historical and descriptive analyses Historical and descriptive analyses
Behavioral changes among suppliers of educational services	Changes in information desired/available to parents	Parental responses	Surveys	RAND/FRC	Statistical tabulations
	Changes in school selection policies	School records	Reports and records Observations	RAND/ISC	Historical and descriptive analyses
	Changes in investment policies Changes in tuition policies Changes in admission policies Changes in educational offerings	School reports to EVA and other school records	Reports and records Interviews		Historical and descriptive analyses

Table III-2 (cont'd)

Economic and Cost Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Market performance changes	Parental satisfaction	Parent responses	Surveys	RAND/FRC	Statistical tabulations
	Prices, cost margins and profits	School records	Reports Interviews	ISC/RAND	Statistical tabulations Statistical cost analysis Historical and descriptive analyses
	Sales promotion costs	School records	Reports Interviews	ISC RAND	Tabular analyses Historical and descriptive analyses
	Rates of innovation and curriculum change	School records	Reports Interviews	ISC RAND	Historical and descriptive analyses
	Responsiveness to parental demands	Parental views School records	Surveys Interviews	RAND/FRC RAND	Historical and descriptive analyses
Resource allocation changes	Entry into and exit from market	EVA records Community observation	Reports Interviews	ISC RAND	Historical and descriptive analyses
	Curriculum changes	School records (schedule of classes) (recommended lesson plans)	Reports Observations	RAND	Programmatic analysis of curriculum and other activities
	Changes in mix of resources			RAND	
	Changes in non-instructional activities				
Fiscal flow changes	Changes in extra-school offerings				
	Changes in revenue sources	Budgets Other financial reports	Reports Observations	RAND	Budgetary analysis including crosswalk
	Changes in expenditure patterns			RAND	Historical and descriptive analyses

### III.C. EDUCATIONAL OUTCOME DIMENSIONS

This subsection discusses the measurement of educational outcomes, principally in the cognitive and affective domains. The ASC will also evaluate the student's educational environment through classroom observation designed (1) to assess the congruence between programs as described and programs as implemented and (2) to yield a measure of teacher effect on student growth.

We assume that the evaluation should not intervene in the demonstration. Therefore, evaluation will not be used as feedback for program improvement. We also assume that the evaluation, like the demonstration, will be an evolutionary process. The evaluation framework will probably not be altered during the course of the demonstration, but the instruments (especially in the affective domain) are highly experimental, so more than one instrument will be used to test each variable. After data have been analyzed, decisions will be made about subsequent data collection strategies. Instruments yielding useful information will be continued; those judged inadequate will be discontinued, and others substituted.

Achievement tests will be administered to all students; other measures of student growth will be used on a small sample the first year. All students will be tested on some measures, but sub-samples for intensive study will also be selected, with each sub-sample administered a different but overlapping set of tests. (The sampling scheme is detailed below.) Those instruments showing the most promise will be used to build a test battery for further use on a large sample in future years. The unit for intensive study will be the classroom.

Because of the long-term nature of the voucher demonstration, students in the early grades will by definition be followed throughout the term of the demonstration. However, a sizable number of students, particularly those in the upper grades, will participate for shorter periods of time. The potential impact of lasting effects will be lost unless these students can be followed beyond the eighth grade. The necessity for assessing the impact of early educational changes on later

achievement and attitudes poses minor problems in a unified school district and major problems in an elementary district.

It can be anticipated that a unified district will be interested in finding out whether changes in the elementary schools affect its secondary schools. It should therefore be relatively easy to arrange to follow voucher demonstration students as they progress beyond the eighth grade. A more serious problem arises in the case of the demonstration site, such as Adam Rock, which is an elementary district and whose students go to another district after the eighth grade.

Early in the implementation phase, it will be necessary to make arrangements with the site districts to follow EEVD students when they leave the demonstration.

The first part of Section III.C specifies baseline data to be collected. The second part discusses cognitive measures; the next is devoted to affective measures; and the final part specifies the design for classroom observation. Table III-4 at the end of Section III.C presents the data specifications and Management relevant to the assessment of educational outcomes.

#### BASELINE DATA

In order to assess the impact of changes that occur during the demonstration, a thorough documentation of key educational trends must be made. The following information will be collected school by school for the current year, and for as many of the four previous years as available.

- o Distribution of students by race, SES, ability
- o Student achievement levels, by race, SES
- o Number, character, goals, and target groups for educational innovations and alternatives introduced
- o Key administrative practices (admissions, discipline, measurement and accountability, etc.), and the reasons for any important changes
- o Important (e.g., district-wide) changes in curriculum; the reasons for these changes
- o Non-curriculum school program activities, and important changes in the kind or level of these activities

- o Non-academic school services (e.g., health care, nutrition, use of school plant by community, etc.)
- o Staff characteristics and any changes therein: teacher training, recruitment and credentials requirements, salary levels, use of paraprofessionals, ratio of guidance and administrative staff to classroom teachers, staff turnover, age distribution.
- o Teaching techniques: team teaching, subject specialists, individualized or small group instruction; use of supplementary and AV materials.
- o Ratio of adults to students in classroom

### COGNITIVE MEASURES

Valid objections have been raised to measuring the success of educational programs solely on their contribution to reading and arithmetic achievement. Creativity and writing skill, for example, are recognized as important, but because standards are difficult to define and success criteria difficult to establish, they are often neglected.

This section deals with the measurement of achievement in reading and arithmetic (basic skills). Alternatives to pre- and post-testing are discussed, as are the problems associated with the use of gain scores. Despite the statistical problems, the use of pre- and post-tests to measure achievement is recommended. We then specify a procedure for measuring student progress in cognitive skills representing a higher level of understanding and ability than that measured by standardized tests.

The generally accepted procedure for measuring program success is to administer an achievement test in the fall (pre-test) and again in the spring (post-test). The difference between the two scores is regarded as an indicator of academic progress attributable to the program. On its face, this is a logical argument; yet, for some time now, leading psychometricians have expressed serious reservations about this kind of gain score, and any plan for measuring achievement must therefore weigh the possible benefits of alternatives and additions to normative tests.

## ALTERNATIVES TO NORMATIVE TESTS

### Criterion-Referenced Tests

Normative and criterion testing each have an important place in evaluation--normative testing provides information for summative evaluation; criterion testing is used in formative evaluation. As diagnostic tools used to plan the next instructional sequence, criterion tests are excellent. No student has the opportunity to let work slide until it is too late for corrective action, and frequent testing provides the teacher with valuable feedback.

However, criterion tests are curriculum specific; no commercial tests are currently available. Nor should the evaluator undertake to write the items, for if objectives or curriculums change, new items have to be written constantly to reflect those changes. This is properly the task of the educational community, not of an outside agency.

### A Predictive-Verification Plan

Theoretically, a sound approach to achievement testing would be to administer an individual intelligence test (such as the Binet or the SISC) as a pre-test, and a standardized achievement test (such as the California Test of Basic Skills--CTBS) as a post-test. In this way, one could derive an expected score for each student based on a measure of general ability. A student's progress would be measured against his own ability, not against that of a normative group. For those meeting or exceeding the expected score, a program would be judged successful. For those who did not achieve up to expected levels, additional information would be sought in an effort to explain what happened. Steps would be taken to help the student do better, as feasible.

Unfortunately, this type of testing is expensive; moreover, intelligence testing is highly suspect in many communities with large minority populations (it is not obvious that administering a test in Spanish would overcome objections to cultural bias).

An alternative procedure might be to use a group intelligence test, the California Short-Form Test of Mental Maturity (CTMM). An "Anticipated

Achievement Grade Equivalent" score to predict a student's performance on the CTBS is derived from his score on the CTMM. Age, grade and sex are taken into account. Using the CTMM in the fall and the CTBS in the spring a student's achievement can be compared to a nationwide sample of students who have similar characteristics. Gross discrepancies between an individual's anticipated and actual achievement are easily spotted. However, this procedure would not overcome objections that might be raised to the administration of individual intelligence tests, and is beset as well with numerous practical and theoretical problems that argue against the probability of achieving reliable results.

In view of the problems raised by these alternatives, and the small likelihood of arriving at solutions acceptable to teachers, administrators and parents, it seems best to reject them in favor of improving well-known and generally accepted pre-post testing, so as to minimize its objectionable features.

#### PRE- AND POST-TESTING OF ACHIEVEMENT

The results of any achievement test must be analyzed to obtain the truest possible assessment of student progress. Four basic concepts must be borne in mind when considering the use of gain scores, especially if a large proportion of the students are educationally disadvantaged.

- o The scores of large numbers of low-scoring students will be so low as to be indistinguishable from chance scores, and for them there is, therefore, no real beginning score.
- o All scores will be affected by a regression to the mean, so that on the post-test many low pre-test scores will be raised by chance, and many high scores will show a loss.
- o The use of a raw gain score for individuals does not take account of the error term associated with each of his test scores, and the intercorrelation of pre- and post-test errors.
- o There is no necessary causal relationship between student gain and instructional strategy--additional information about the student's past and current educational experiences is needed before that relationship can be established.

A number of authors have questioned the validity of raw gain scores and it has been shown that they are extremely biased estimates of true



gain.\* The basic problem arises because of errors of measurement associated with both pre- and post-scores, and correlations between them. Cronbach and Furby offer the most sophisticated method for estimating true score.\*\*

### School Status

In addition to information about students, a continuing measure is needed of each school's relative academic standing. Annual (spring) testing will be sufficient for this purpose. Of relevance here is our ability to observe the ranking of a school in relation to its popularity among parents, as defined by applications for admission and requests for transfer-out.

### Choice of Achievement Tests

Because we wish to describe demonstration outcomes as precisely as possible it is more important to maintain comparable historical data than to focus on any particular achievement test because of its technical merits, which are likely to be marginal in any event. Tests currently being used to measure reading and arithmetic achievement should therefore be used during the voucher demonstration. If they are not routinely administered in every grade, provisions should be made to complete the battery.

It is particularly important that the appropriate level of test be administered. If historical data indicate, for example, that students in the fourth grade read on the average at second grade level, then a test appropriate to the second grade should be used. In this way, the number of scores achieved by chance is reduced, and a more accurate picture of what the students know is obtained. An incidental benefit

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\* For example, see Harris, C. W. (ed.), Problems in Measuring Change, University of Wisconsin Press, Madison, Wisconsin, 1963.

\*\* Essentially their technique is to use multiple regression to remove the effect of the pre-test score and its error on the post-test score, and vice versa. The technique also takes into account concurrent scores on other tests to improve the estimate. Cronbach, L. J., and L. Furby, "How Should We Measure 'Change' - or Should We?", Psychology Bulletin, 74, 1970, pp. 68-80.

is that fewer students are subjected to a failure situation, with all its attendant unpleasant effects.

### Test Instructions and Procedures

While we are aware that test procedures in school districts rarely conform to good practice, in keeping with the assumption that the evaluation is not to be an intervention, we do not make any recommendations about testing procedures. Rather we intend to monitor district implementation of the achievement testing in order to observe whether the demonstration itself leads to improved procedures.

We shall take cognizance of the following factors as evidence of change:

- a. Increased use of the appropriate level of the test, rather than the use of grade level tests for populations well below standards of performance.
- b. Better preparation of disadvantaged students for test-taking as evidenced by familiarizing them with test formats and instructions.
- c. Familiarization of test administrators with the instructions, including standardization of responses to questions about guessing.
- d. Better adherence to time allowances specified in test manuals.
- e. Provision of good physical surroundings for test-taking, including ventilation, lighting and spacing of students to minimize chances for deliberate or inadvertent copying.

### HIGHER ORDER LEARNING

Educational evaluations rarely measure higher level cognitive learning (creativity, abstract reasoning, problem solving, etc.). This is partly due to the lack of good standardized group tests of most higher cognitive abilities, and in part to the emphasis on basic reading, arithmetic and specific content material that has dominated education objectives in recent years. The EEVD has potentially important implications in this context for

two quite separate reasons. First, some parents may place high value on higher order learning, and schools may respond by emphasizing these objectives more in curricula design. Second, whatever the views of parents may be, it is an important aspect of student achievement.

### Abstract Reasoning

Although there are some standardized tests for abstract reasoning and problem solving in mathematics and science courses, these are tied to specific course content and are largely designed for use in higher grades. Reasoning ability is sometimes measured by tests of general intelligence or mental ability. Of these tests, the UCLA Center for the Study of Evaluation rates the Otis-Lennon mental maturity test higher than any of the other tests reviewed; this test will be given to a sample of classrooms.

Another test for reasoning ability is the Primary Mental Abilities test, which reports somewhat different sub-scores than does the Otis-Lennon. Although this test is not rated as high as the Otis-Lennon, we feel that it should be given to a small sample of students who are not given the Otis-Lennon. These tests are not being used as intelligence tests; our interest is in the profile of sub-scores.

### Creativity

Although creativity is difficult to define in operational terms, there is a large body of research on the topic, and much is known about the characteristics and needs of the creative person. Creativity is not necessarily associated with high intelligence, and it appears that the learning environment of the creative individual must be different in many respects from that of his less creative counterparts.

Unfortunately, research on creativity has not resulted in any simple and highly reliable measures. However, some standardized tests for creativity are available, and although their validity is not as high as one would like, they appear to be worth pursuing in the EEVD. One such test that is rated higher than others by the UCLA Center for Evaluation is the Torrance Test of Creative Thinking. This test reports sub-scores

on nine categories of creative thinking, and is promising enough to administer on a sample basis.

### Scaling of Student Performance

Essay examinations and written reports are useful in measuring a broad range of student achievement, especially achievement that is highly relevant to future academic success. Unfortunately, the grading of this type of material is extremely unreliable. Part of the problem stems from the multi-dimensional characteristic of complex learning activities. Teachers usually report a single grade which is a subjectively weighted sum of achievement in several dimensions (e.g., in writing: vocabulary, clarity, neatness, spelling, originality, etc.).

In spite of the difficulties inherent in scoring essay type material, some kinds of cognitive activity simply cannot be measured adequately in other ways. Standardized tests (and all short answer tests) at best measure only retention of specific content material. We will approach this problem by continuing to develop a method proposed by Rand for measuring performance across a wide range of student activities such as writing, problem solving, and artistic expression.\* The method is based on a judge's evaluation of student achievement levels as reflected in samples of their work collected periodically during the EEVD, so that the scaled scores can be used to indicate both status and change. Because this effort is in the development stage, it will be used on a relatively small sample during the first year of the demonstration. The scaling method is detailed in Appendix D.

### AFFECTIVE MEASURES

Interest in the improvement and measurement of affective states (motivation, attitudes, self-esteem, self-awareness, happiness and other personality variables) has steadily increased in recent years, motivated in part by the lack of success in modifying cognitive achievement through "standard" educational innovations. The importance of affective growth is

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\* Donaldson, T. S., Subjective Scaling of Student Performance, The Rand Corporation, P-4596, 1971.

defended on the basis of two arguments. One view contends that affective factors are important because they are believed to be the major determinant of cognitive achievement, and there is considerable experimental evidence supporting this view. The other view holds that growth in affective rather than cognitive factors is the more relevant goal of education. These views are certainly not mutually exclusive, and most educators agree that noncognitive factors are important for both reasons. In fact, the distinction between affective and cognitive achievement is rather artificial: attitudes and motivation have strong intrinsic cognitive components, and cognitive skills have strong intrinsic affective components.

Despite this growing discourse among educators about the importance of affective growth, the successful implementation and measurement of affective objectives in the schools remains disappointing. Affective objectives must be stated in the development of curricula, then translated into classroom activities. This process is a difficult one; authorities do not agree on definitions of affect nor do they agree on the relative importance of affective objectives. Even where this hurdle is overcome the status of affective measuring instruments is quite primitive. The more successful evaluations of affective growth are tied to specific and behaviorally stated objectives, and special instruments are designed for the purpose.\*

A number of tests and procedures for evaluating affective outcomes are discussed below. In keeping with our general approach, the analysis of EEVD impact on affective growth will: (1) examine affective objectives as they are represented in curricula, policy, and programs, to determine the schools' attempt to produce these outcomes, (2) determine how administrative intentions are actually implemented at the classroom level, and (3) attempt to assess student affective growth.

#### EDUCATIONAL AFFECTIVE OBJECTIVES

Schools can respond to incentives and pressures arising from the EEVD by attempting to improve or modify affective objectives. Information

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\* See, for example, Virginia Educational Needs Assessment Study, 1970, University of Virginia, Virginia State Department of Education, Richmond, Virginia.

about such objectives can be obtained from statements of curricula and school policy, and from interviews with school personnel. A special attitude survey (Delphi) will also be used to determine objectives as voiced by parents and school personnel and attitudes about the school's success in meeting objectives.\* A "successful" EEVD should be accompanied by (1) convergence in attitudes about education objectives among the various populations of individual schools (parents, teachers, specialists, administrators) and (2) convergence between attitudes about objectives and the schools' success in meeting the objectives.

If objectives within various sub-groups of the community vary significantly from those of school personnel, we will want to know how they differ and how the schools attempt to deal with these differences within the context of the EEVD.

#### AFFECTIVE OBJECTIVES IN THE CLASSROOM

School personnel may introduce new curricula and programs as part of an augmented set of objectives; the important factor to monitor is what change actually takes place in the classroom. Teachers have their own attitudes concerning educational affective objectives, and they have teaching styles and modes of interpersonal interaction that are often extremely resistant to change. We must therefore assess the implementation of affective objectives as reflected in teacher behavior. Data for this analysis will come primarily from classroom observations.

#### STUDENT AFFECTIVE GROWTH

Measures of affective states are either complex (involving qualitative interpretation of projective tests and experimental manipulations involving tasks unlike classroom learning), unreliable, or both. In many

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\* The purposes and methods of the Delphi technique of attitude estimation are elaborated in Appendix F. The utility of estimating parent and school personnel educational objectives extends beyond the affective domain, but will be of particular importance here because agreement about the importance of cognitive objectives can be more readily assumed.

cases the most sensitive instrument for assessing affect is another person. An observer can discriminate between unhappy and happy children with greater reliability than can affective tests. However, more subtle affective states such as self-esteem, achievement motivation, or attitudes about school are difficult to determine, and cursory assessment is not reliable.

One of the effects of the EEVD on children may be simply to allow them (through their parents) to choose school environments in which they are happiest. The overall happiness (or mood) of a classroom can be rated by observers. The technique for doing this is described below.

A number of methods will be used to assess student affect. However, because of the low reliability of available methods they will be used only on a sample basis during the first year, in order to identify adequate measures. Some of the measuring instruments will probably be omitted as the demonstration progresses, and others will be added or modified. It would be pointless to continue measurements that show up early in the program as insensitive or inappropriate. The primitive state of development of affective assessment makes necessary considerable flexibility in this part of the evaluation. Procedures and instruments for affective assessment are described below.

### Classroom Sociology

As parents and children exercise choice in school selection, changes in classroom social structure and interaction may occur. School policy may favor integration, but if students are grouped by ability, de facto segregation may result at the classroom level. Within a classroom, teachers may produce a kind of segregation by seating arrangements, or by their expectations and interaction with students. Alternatively, there may be a reduction in the number of isolated students in a classroom, or in conflict involving ethnic and minority groups, because parents select schools on the basis of how "accepted" the child feels in the school. In order to assess the impact of the EEVD on the sociology of the classroom, a sociogram will be constructed based on the students' response to the following questions:

1. Name the children in the classroom that you would like to invite to a party.
2. Name the children in the classroom that you generally play with.

Student-teacher interaction and questions about integration will also be investigated through classroom observation described below.

### Student Self-Evaluations

One reason children dislike school -- and some teachers -- is their feeling that the teacher's opinion of them is low. An attitude scale developed by St. John will be used for assessing the child's perceptions of the teacher's opinion of him.\* This procedure (involving answers to: "My teacher thinks I am") is described below in the discussion of classroom observation, where its use for assessing the effects of teacher expectations is discussed. Student self-esteem will be inferred from this scale.

Coopersmith has developed a scale for measuring self-esteem which shows some reliability when used experimentally, although responses on the test do not discriminate between ethnic and minority groups, nor do they appear amenable to change over short periods of time.\*\* In order to further explore the utility of this test, it will be administered to a small sample of students in the first year of the EEVD. The test items are shown in Appendix F.

Sears has designed an instrument for indicating a student's self-concept, and has related self-concept scores to school achievement. A number of research studies report high reliability for a 48 item abbreviated form.\*\*\* This instrument will be administered to a small sample to

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\* St. John, Nancy, "Thirty-Six Teachers: Their Characteristics and Outcomes for Black and White Pupils" American Educational Research Journal, 8 November 1971, 635-648.

\*\* Coopersmith, S., The Antecedents of Self Esteem, W. H. Freeman and Co., San Francisco, 1967. Private Communication, 1970.

\*\*\* Sears, P. S., and Sherman, V. S., In Pursuit of Self Esteem, Belmont, California, Wadsworth Publishing Co., 1964.



determine its worth for assessing status and change in self concept. It is shown in Appendix F. The sample chosen will be different from the one for the Coopersmith scale.

In order to determine the effects of the EEVD on students' attitudes about school, a slight modification of a questionnaire developed in Cincinnati and used in previous Rand work will be used.\* The two forms of the questionnaire, one for grades 1 through 3 (attitudes toward self and school) the other for grades 4 through 8 (student survey) are included in Appendix F.

The concept of achievement motivation has been the subject of considerable research in recent years. It is fairly well established that personality differences exist between high and low achievers, and that high achievers tend toward learning material that is more structured. Traditional measures of achievement motivation are projective tests, and a few attempts using objective tests have reported low reliability. However, Myers reports on an objective test that has reliability comparable to that of projective methods.\*\* This test, shown in Appendix F, will be given in a small sample of classrooms.

A number of other instruments and procedures could be used but their expected contribution to the evaluation is low and care must be taken not to overburden the student with tests. For this reason, general personality tests will not be used at all. They are time consuming, they have low reliability, and significant changes in scores can rarely (if ever) be associated with programmatic changes in education.

The procedures discussed in this section, coupled with data from classroom observations and community surveys, will provide an adequate data base from which to assess the effect of the EEVD on student affect. However, because of the state of development of affective measurement, much of this effort is developmental in character, and is expected to undergo change as the demonstration progresses.

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\* Rapp, M. L., Brunner, G. L., and Scheuer, E. M., An Evaluation Design for San Jose Unified School District's Compensatory Education Program, The Rand Corporation, RM-5903-JS, May 1969. The questionnaire was originally developed by Cincinnati (Ohio) School District for use in compensatory programs.

\*\* Myers, A. E., Risk Taking and Academic Success and Their Relation to an Objective Measure of Achievement Motivation, Educational Testing Service, RE-64-2, January 1964.

## CLASSROOM OBSERVATION

### Purpose

Observation will be carried out in the classroom so that the processes of education may be related to educational outcomes. Two purposes are served by observation: (1) program verification, to ascertain the congruence between the program as described and the program as implemented, and (2) measurement of teacher effect on students' cognitive growth, as one of the educational variables of a student's performance. As a measure of the educational impact of the voucher demonstration, classroom observational data can help relate what happens in the classroom to actions taken by parents in transferring their children.

### Program Verification

In order to understand the effects of education, we must understand the environment in which formal education occurs. One of the questions addressed by the evaluation is the impact of the EEVD on the improvement and diversification of educational programs. A program is a set of activities requiring resources, designed to meet a stated objective. The instructional strategy specifies how the resources are to be used. Often, however, there is no observable match between the way a program is designed to operate and the way it is implemented in the classroom.

As a check against the mistaken attribution of given results to the effect of a specific treatment, we need a description of the programs as they are designed, and an opportunity to see what is actually happening in classrooms. No elaborate observation schedules or checklists need be constructed for this purpose, because the nature of each observation is highly dependent on the official description of the program.

First, a description of each program will be obtained from the appropriate school administrator. This description should include information about adult/student ratio, desirable staff characteristics,

instructional technique and material, other resources, and special training. With this description in mind, each classroom should then be visited and the teacher informally interviewed. The observer will then be in a position to describe what actually happens in the classroom, and to guard against the pitfall of attributing results to the wrong causes.

### Teacher Effect

A great deal of recent research on teacher behavior has centered around the concept of the self-fulfilling prophecy -- the idea that a teacher's expectations will strongly influence student performance. Teacher expectation will not be measured directly, because the very act of having to respond to questions about what she expects from her students can have an unmeasurable effect. Teacher expectation will be measured by the way in which it is reflected in her classroom behavior. Special attention will be paid to whether that behavior is the same toward all students in the class or different for sub-sets of students.

Much of the research on teachers strongly suggests the futility of collecting data in the form of self-administered tests to determine their attitudes.\* The literature on the unreliability of self-report inventories is extensive. Studies have shown that some widely used inventories are highly susceptible both to faking and to spurious self-description. Given different sets of instructions, the same person will make two different scores on successive administration of an inventory. This again suggests the need for classroom observation.

Since one of the desiderata of an evaluation is that it be unobtrusive, the task of the evaluator is to choose the least number of measures that promise the highest probability of accomplishing his objectives. In

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\* Donaldson, T.S., An Information System for Educational Management, Vol III: Data Requirements for Evaluation; A Review of Educational Research, The Rand Corporation, R-932-LACS (forthcoming).

addition, when an observation schedule is constructed, one of its salient characteristics is the degree of inter-rater reliability. A complex schedule requires intensive training of highly skilled observers, since it generally encompasses many dimensions of behavior to be described. If, however, the evaluator specifies few dimensions, and each one is amenable to unambiguous observation, high inter-rater reliability will be achieved with relatively little training of observers.

In order to meet the criteria of being unobtrusive and at the same time show good promise of high inter-rater reliability, a shortened version of Ryan's Characteristics of Teachers Scale as modified by St. John will be used. The three items on which there was lowest inter-rater reliability will be omitted, as will an overall score, resulting in ten aspects of teacher behavior to be rated on a seven point scale:

Aloof-responsive<sup>\*</sup>  
Dull-stimulating<sup>\*\*</sup>  
Partial-Fair (racially)<sup>\*</sup>  
Unsympathetic-Understanding<sup>\*</sup>  
Harsh-Kindly<sup>\*</sup>  
Uncertain-Confident<sup>\*\*</sup>  
Disorganized-Systematic<sup>\*\*</sup>  
Inflexible-Adaptable<sup>\*</sup>  
Pessimistic-Optimistic<sup>\*</sup>  
Narrow-Broad<sup>\*\*</sup>

<sup>\*</sup> Items with high factor loading on child-oriented scale.

<sup>\*\*</sup> Items with high factor loading on task-oriented scale.

Each of these attributes will be described in behavioral terms when instructions to raters are written. Sufficient guidance to ensure comparable use of the rating scale will be given, but a tightly constructed set of directions will be avoided. Too much detail in the specification of behaviors to observe creates too narrow a focus for observers.

It should be recalled that the design of the evaluation specifies that it will be flexible and evolving. Therefore, our intent is to observe in the first year a random sample of teachers (stratified to insure representation of all grades and schools) using the scale just outlined. Each teacher selected for observation will be observed for a total of six class hours during the academic year. In this way a more representative sample of her behavior is obtained than if she is observed, say, for one day. In six different observations, more opportunity is available to see a variety of classroom lessons and teacher behavior. Whereas a teacher's behavior may not be representative during one observation because of the presence of an observer, this effect will be lessened with repeated classroom visits by the same person. Furthermore, explaining to the teacher the purpose of classroom observation and emphasizing that her performance is not being evaluated will greatly mitigate her natural apprehension. The analysis of the scale will be designed to relate the observed teacher characteristics to student outcome, as measured by cognitive tests.

Scores will be derived for each teacher on both the child-oriented and the task-oriented scales. Each classroom in which a teacher was observed will be stratified on the basis of students' entering achievement scores in reading. Three groups of students will be formed -- those whose scores were high, average and low in relation to the mean entering reading score for their classroom. For each group of students, a gain score from pre- to post-test will be computed. The distribution of gains will be examined in relation to the teacher's observed behavior scores to see if there is a measurable difference in student outcome that can be attributed to teacher behavior. The same kind of analysis will then be done for individuals.

A second measure of teacher influence will be obtained by administering to students a short (10-item) scale "My teacher thinks I am," also developed by St. John. Whereas observation will provide an ob-

jective indication of how teacher characteristics influence student performance, it is also necessary to obtain a measure of the child's perception of his "worth" in the eyes of his teacher.

The St. John scales ask each child to rate himself from 1-5 on how he is perceived by his teacher on the following dimensions:

sad-happy  
lazy-hard working  
mean-kind  
proud-not proud  
stupid-smart  
bad-good  
unsure-sure  
unsuccessful-successful  
not a good student-a good student  
follower-leader

A consideration of both his teacher's actions and a child's perception of himself in the classroom should provide a reasonable explanation of a student's performance.

#### CLASSROOM SAMPLING SCHEME

The purpose of the classroom sampling scheme is to make feasible the use of a fairly large number of different tests and measures without overburdening the student, test administrators, or data analysis. Tests and procedures which are high in reliability are given to large samples, while those lower in reliability (or untested) are given to smaller samples.

A school district contains many schools, each comprised of various, but not equal, grade levels. Within each grade there are a number of classrooms. Since we do not know the school district that will participate, it is impossible at this time to determine the exact number of classrooms for each grade at each school. In the final application the sampling scheme will have to include considerations of SES and other factors to insure that pertinent factors are sampled. However, since this information is not now known, the sample procedure is an approximation, and is based mostly on considerations of relative, rather than absolute, sample

size. In order to arrive at these approximations -- especially for the time-consuming measures used on the smaller samples -- we considered a school district of 15,000 students and 40-60 classrooms per grade spread over thirty elementary and intermediate level schools. The sample structure presented is for the first year of the EEVD; in later years refinements in evaluation procedures and test selection will alter the sample plan.

The sample plan is shown conceptually in Table III-3. The standardized math and reading tests will be given to all classrooms.

The basic purpose of the tests shown in Table III-3 is to allow an assessment of a wide range of student performance. Some of these performances have the potential to change relatively rapidly over time (math and reading), while others will not (self-concept, mental abilities, etc.). Tests measuring those activities which are more amenable to change will be given on a pre- and post-basis. These tests are indicated in the first column of Table 1, and consist of the math and reading standardized tests, and the scaling procedure for classwork.

Those performances which are expected to change slowly (if at all) over time will be administered once a year in the spring, beginning in 1973. Thus, the first test administration occurs before the EEVD begins, and is part of the baseline data.

The sampling scheme not only allows for an assessment of achievement, but interrelationships between test scores can also be investigated. In some cases a test score may show no achievement change, but is useful in the interpretation of other test scores. For example, it will be possible to analyze reading achievement in terms of basic ability, self-concept, creativity, and other scores, rather than simply in terms of the whole classroom taken as a homogeneous body.

Affective growth and reasoning ability are not expected to change in a short time and it will be necessary to follow students over several years in order to detect possible changes in these factors. Since these tests are not given to all students, and because there is mobility in and out of the school district, it may not be possible to follow adequately the first

Table III-3

DATA SAMPLE STRUCTURE<sup>1</sup>

<u>Data Source</u>	<u>Test Period</u> <sup>2</sup>	<u>Grade</u>							
		1	2	3	4	5	6	7	8
Reading Achievement Test	P-P	All Classrooms							
Math Achievement Test	P-P	All Classrooms							
Otis-Lennon Mental Ability	SP	a	a	a	a	a	a	a	a
Primary Mental Abilities	SP	b	b	b	b	b	b	b	b
Torrance Tests	SP	c	c	c	c	c	c	c	c
Sears Self Concept	SP					b	b	b	b
Coopersmith Self Esteem	SP					a	a	a	a
St. John Student Scale	SP				c	c	c	c	c
n-Achievement (Myers)	SP							c	c
Attitude toward self and school	SP	c	c	c					
Student Survey	SP				c	c	c	c	c
Scaling of Performance	P-P				c		c		c
Sociogram	SP	d	d	d	d	d	d	d	d
Classroom Observation I	TERM	a,b	a,b	a,b	a,b	a,b	a,b	a,b	a,b
Classroom Observation II	TERM	d	d	d	d	d	d	d	d
Maximum tests for group a =		3	3	3	4	5	5	6	6
Maximum tests for group b =		3	3	3	4	5	5	6	6

<sup>1</sup> a and B are independent samples of classrooms, c is a sample made up of classrooms in sample a and b, and  $c = 1/4a + 1/4b$ . Sample d =  $1/2c$ . See text for details.

<sup>2</sup> P-P = pre-post (Fall, Spring).

SP = Spring only



year sample. The sample size is small on some measures, and in the later years it will decrease as students move out of the district. However, those who remain in the district will be tested in subsequent years.

Analysis of test results after the first year should produce a smaller test battery for use in subsequent years, and will be administered to a much larger sample, perhaps all students. While the mobility problem will still exist, the diminishing sample problem will be less serious.

#### DATA ANALYSIS

We have said very little about specific data analysis methods. In many cases the method is obvious; in others, it may not be so obvious. The use of change versus status scores has already been discussed. In those cases where change scores are used (if they are) the regression technique suggested by Cronbach and Furby (1971) will be used to estimate true change.

The various student inventories (self-concept, self-esteem, or n-achievement) will be analyzed in terms of their subscores, and statistical tests will be used to determine the significance of changes in the proportion of students in subscore categories. We do not anticipate factor analysis of these data. Other investigators have already factor analyzed these tests and the factors (and test items related to each factor) are reported.

Multiple correlation analyses will be used to investigate the relationships between the various achievement indicators. If it appears necessary, we will investigate the multidimensional achievement space through factor analysis.

The classroom observational data will be analyzed using counting and sorting techniques and appropriate statistical tests of significance. Some content analysis may be attempted in addition. Analysis of school records and interview material will be primarily in terms of content.

In general, the key analytic question is not statistical, but rather how to stratify, classify, and compare various measures to that meaningful interpretations can be made.

Table III-4 presents the outcome dimensions, indicators, data sources, data collection methods, primary data collection responsibility, and preferred data analysis techniques for the assessment of educational outcomes.

Table III-4

## EDUCATIONAL DATA

Educational Outcome Dimensions	Indicators	Data Sources	Data Collection Methods	Primary Data Collection Responsibility	Preferred Data Analysis Techniques
Cognitive achievement	Achievement test scores	Standardized Reading Test Standardized Math Test Otis-Lennon Mental Ability Primary Mental Abilities Torrance Creativity Test Performance Scaling	Paper and pencil tests, and classroom performance	EVA*	Stratified sample comparisons of status and gain scores using various statistical procedures (analysis of variance, regression, contingency tests, etc.)
Affective growth	Self-report inventories	Sears Self Concept Coopersmith Self Esteem Myers n-Achievement Attitudes toward Self and School Student Survey St. John Scale	Paper and pencil tests	EVA	Stratified sample comparisons of status and gain scores using various statistical procedures (analysis of variance, regression, contingency tests, etc.)
Education objectives of parents and school personnel	Expressed attitudes and opinions	School records, views of school personnel and parents	Examination of school records, personal interviews, Delphi Attitude Estimation Survey	Rand	Content analysis, and statistical techniques, appropriate to Delphi (analysis of variance, linear estimations)
Teaching plans and practices	Formal and informal program process and curriculum plans; classroom behavior	School records, views of school personnel, observed classroom behavior of teachers	Personal interviews, examination of school records, classroom observation	Rand	Counting, sorting, rating, content analysis
Sociology of the classroom	Classroom behavior and organization	Observed classroom behavior, students	Classroom observation, paper and pencil tests	Rand	Counting, sorting, rating, content analysis, sociograms

\*For Performance Scaling EVA's responsibility is to collect the sample of student's work. Rand will do the scaling.

#### IV. OUTCOMES AND POLICY

The presentation of Rand's evaluation plan has moved from the general to the specific, including: (1) an introductory overview of the structure and approach of the Plan; (2) presentation of the basic organizational framework of the Plan--theory and major issues of the evaluation and of public policy, specification of categories for gathering and ordering information about program outcomes, selection of the range of outcome dimensions of initial interest and a matrix showing relationships between information categories and outcome dimensions; and (3) extended discussions of the salient issues of data collection and analysis, organized according to professional skill areas, with tables showing the indicators selected for the study of each outcome dimension, probable data sources and data collection methods, and appropriate techniques for data analysis.

In this Section we return to the general level--addressing first the major policy questions which have significantly shaped our substantive planning and next the operational design by which our empirical and judgmental data will be translated into informed statements responsive to those policy questions.

#### POLICY QUESTIONS

The basic policy question to which the EEVD evaluation must respond is, should the voucher mechanism be extended to other communities? As we noted earlier, this question requires evaluators to identify effects of the voucher mechanism on private and public interests. Schools and governments (local, county, state, federal) are the most important loci of public interests; families, community groups, churches, and business groups (existing or new) are important loci of private interests.

The remaining policy questions derive from the first:

- o How desirable is it to implement some mechanism that gives parents a more direct voice in choosing the schools their children attend?

- o How should educational diversity, especially the creation of new schools, be encouraged by public policy, if at all?
- o Should some form of public support for private and parochial schools be initiated, and if so, what form should it take?
- o To what extent should "marketplace" incentives be introduced into education, and what form should such incentives take?
- o To what extent are vouchers and their implementation in the EEVD a necessary and sufficient device for attaining the objectives of public policy?

#### Changed Options for Parents

In ascertaining the desirability of giving parents more direct control in choosing their children's schools, it is important to recognize that "desirability" in this instance means different things for different groups involved. A positive answer to this policy question requires several conditions. First, significant numbers of parents must find the voucher mechanism an agreeable form of control, the exercise of which brings increased satisfaction with schools. Second, parents must exercise their more direct voice in schools in ways that educational personnel find acceptable and from which students benefit. Third, parental preferences and children's needs must be sufficiently similar to prevent endless division among schools.

Of course, these conditions are not likely to be met among all groups to the same degree at the same points in time. For example, we expect parent expression of educational preferences to escalate during the early years of the demonstration and then diminish as new patterns are established. During the escalation period, expression of parent dissatisfaction with schools may increase precisely because they are using new options and attempting to express preferences. With respect to the second condition, it is possible that school personnel and

parents will develop agreements about education long before impacts on students appear in aggregate measures. With respect to the third condition, special concerns of different ethnic and income groups may surface heretofore latent conflicts, with increased benefits to some groups interpreted as disadvantages to other groups.

For these reasons, the evaluation reports will give more credence to relative measures and patterns of congruence between elements over time than to absolute measures of particular elements at given points in time.

#### Educational Diversity

Should public policy consciously promote educational diversity at all? If it should, is the preferred method:

- o To increase diversity within the existing public school formula?
- o To support the establishment of new schooling options outside the public schools?
- o To support both options?

The case for educational diversity will be addressed in operational rather than normative terms. If under the EEVD a substantial number of parents choose to send their children to schools with widely differing characteristics relative to the pre-voucher situation, then we might conclude that educational diversity is actually sought in practice.

Many observers have expressed concern that support of diversity through vouchers will lead to the decline or disappearance of the public school system, with a number of potential disadvantages:

- o The growth of racial and class segregation in the voucher-financed schools, reflecting parental preferences.
- o The relegation of public schools to the position of educators of last resort for problem pupils or handicapped pupils that the voucher schools reject.

- o Consequent to such trends, the unifying social role of the public schools in a democratic system will disappear, while the voucher schools substitute a separating social influence.

While the EEVD is designed to prevent segregation by race or socio-economic class, there can be no assurance that this intent will be met. The evaluation reports will display information about the actual distribution of student applications and enrollments by race. Similarly, the resulting composition of student bodies in public and private schools will be displayed as evidence concerning the flow of children with handicaps, educational disadvantages, and disciplinary problems to public and private schools in the demonstration area.

The EEVD cannot provide a final answer to the question of whether a voucher system significantly reduces political democracy or social unity. The information on school segregation by race and class will provide partial evidence. Additional information will flow from the parent and community surveys, community observation, interviews, etc. But it is entirely possible that a five to seven year period is not long enough to provide conclusive evidence. What is taken in the short run to be clear indication of systematic social or political fragmentation may, over a longer period, turn out to be an adjustment to new situations, with no significant long run consequences for social unity or political democracy. Similarly, no major effects may be noted during the demonstration period, but over the long run the new institutions may reduce communication between various social groups.

#### The Religious Issue and Support to Private Schools

Public support of parochial schools has been a long-standing source of conflict within education and at every level of government. Public officials and citizens will ask whether the EEVD escalates or dampens these conflicts.

If the EEVD were to cause the existing education system to become substantially more fragmented along sectarian lines, it is likely that the religious issue would become more severe. People might perceive

the EEVD as a mechanism for providing public tax funds to support religion. In this case, the EEVD would escalate rather than diminish community conflicts.

It should be remembered, however, that the present education system already contains a sizable sector of schools sponsored by religious groups. Parents of children in these schools have become increasingly restive about the financial burden of school taxes in addition to tuition. The increasing cost of operating these schools is leading to actual or potential closure of religious-sponsored schools and transfer of educational responsibilities for their students to the public schools. Therefore, political demands for public aid to parochial schools are increasing. Conceivably vouchers could be a way of meeting this demand without violating the Bill of Rights or local political feelings about religion and the schools.

The evaluation of EEVD must probe the policy implications of the religious issue. There are several pertinent EEVD outcomes. One is the extent to which religiously oriented schools increase enrollments and obtain financial support from the EEVD. Another is the attitude of community groups and community leaders towards such changes. Still another is the attitude of the parochial schools themselves towards the EEVD. Finally, there are the attitudes of the individual members of the community toward parochial schools. Pertinent data will be obtained from a number of ASC data sources, as described elsewhere in the Technical Analysis Plan.

Public support for private schools does not raise the constitutional issues that support to parochial schools raises, but it still generates political concern. Will there be a shift of funds for education for the broad community to education for a social or economic elite in private academies?

The analytical task will be to determine if such a shift has taken place. The rules of the EEVD are designed to insure that any increase in enrollment at private schools allocates spaces among all income groups in the community. Whether this plan works out in practice is important information for public policy.



If some of the private schools are sponsored by political groups and particularly if the political groups involved are at one or the other end of the spectrum of political ideology, the question of indoctrination will become a political issue. The possibility that tax funds would be used to further noneducational objectives is sure to be discussed.

Racial segregation questions are also sure to arise. Again, the EEVD rules seek to preclude political or racial exclusivity, but their effectiveness must be analyzed.

Data illuminating these issues will come from several sources. A particularly important source, however, is observation of schools and analysis of their programs.

#### The Harmony of the Profit Motive and Educational Objectives

Voucher systems seek to harness the desire for private profit to the service of improving education. Are these compatible? Compatibility depends upon two factors: (1) parental information about education; (2) the congruence between parental preferences and the educational needs of their children.

If parents have or can obtain sufficient, objective and correct information about (1) the educational needs of their children, (2) available educational processes and (3) potential educational results, then it is likely that the desire for profit will be consistent with educational objectives. Informed parents will be able to select rationally from among suppliers of educational services. The actual or would-be suppliers of educational services must be prepared to offer informed buyers quality services and deliver what they promise or suffer loss of students to other schools. If, on the other hand, parents are uninformed, conditions will be propitious for fraud. Hucksters seeking a fast profit can make offers that cannot be fulfilled, but parents may be unable to perceive this because of their lack of knowledge. If parents do perceive this failure, the promoters may simply move on to some new field with their profits. In such a situation a form of Gresham's Law would apply and honest schools would tend to be driven out by shoddy operations.

This form of market failure might lead parents to learn by experience so that in later years they would have the information required to demand meaningful promises, make perceptive choices and require high standards of entrepreneurial performance. It is vital, therefore, that the Analysis and Survey Contractor assess not only how adequate the informational quality of the market is at the start of the EEVD, but how this dimension of the market changes throughout the conduct of the demonstration.

In sum, one important determinant of the harmony between the profit motive and educational objectives is whether parents are or can become well informed about education. If not, market failure is likely and the profit motive will lead to educationally adverse results; if they are informed the desire for profits should be a force for educational improvement.

The parental surveys give extensive attention to parental information. Various aspects of the empirical field research will explore the program (product) offerings of schools and information generating activities. It will be the task of the public policy analysts to put the various sources of information together in order to assess the informational adequacy of the education market in each demonstration site.

The second aspect of profit-motive and educational-objectives harmony is more complex. In the EEVD, parents are the purchasers that select schools. It is their children, however, who actually receive or consume the educational services. Are parental preferences for education congruent with the educational needs of their children?

Under present educational arrangements, the definition of educational needs and selection of programs is basically the responsibility of professional educators. School boards are lay-controlled; parents have inputs of various sorts in determining programs and curricula; and affluent parents may be able to move to different school districts or put children in private schools and so influence the educational programs provided their children. In these ways parents can exert preferences among available educational offerings. Even so,

professional educators have a major if not dominant role in assessing educational needs, selecting curricula and determining programs. Teachers' professional training and experience is supposed to give them expertise in these matters that lay persons lack.

The EEVD will shift the balance in the determination of curricula and programs away from professional educators in favor of the laity. A clear public policy issue is the effect of this shift.

Rand's analysis of this issue will center on an examination of the consistency or disparity between parental preferences and goals for their children's education and the standards of the education profession. If there is a high degree of consistency then the significance of this issue diminishes. If there is a substantial disparity then it becomes very important for public decision. Evaluators, of course, cannot determine whether parental desires or professional standards should prevail; this is a normative judgment beyond the realm of analysis. The evaluation, however, should be sensitive to the potential disparity between what professional educators believe to be the educational needs of children and how parents perceive these needs.

Again, the time pattern of change is very important. Data relevant to the congruence question will come from several sources, as shown elsewhere in this report, but particularly important sources of data are parental surveys and professional observation and analysis of school programs.

#### Alternatives to Vouchers

The public policy concerns discussed above are serious enough to warrant asking whether vouchers are the most appropriate method of meeting public policy goals. For example, we have pointed out above that one might seek to promote diversity, choice, and parental control through changes in the public schools rather than changes in the educational marketplace.

The evaluation of EEVD, taken as a whole, should cast considerable light on this question. If the evidence shows either that the

objectives of the demonstration are not being met, or that they are being met at high costs in terms of the public policy issues discussed above, then other methods of meeting EEVD goals may become imperative, if they are to be attempted at all.

The evaluation will also offer evidence about the nature of alternative systems. For example, if it turns out that the EEVD public schools offer substantial diversity in curriculum as compared to other public schools, then a workable alternative may be open enrollment plans which include incentives for school administrators to respond to market demand.

More generally, the evaluation data can be used to indicate whether the important favorable outcomes of EEVD are separable from whatever adverse consequences may result from the voucher experiment. This would allow policymakers to decide whether they consider vouchers a necessary condition for meeting EEVD objectives. The basic function of the evaluation of the demonstration, of course, is to determine if vouchers are a sufficient condition for meeting EEVD goals.

#### ORGANIZING THE PUBLIC POLICY ANALYSIS

The basic tasks of data collection and analysis will be performed by three professional teams. Each team (political/social, economic/cost, education) will test the utility and relevance of data to be collected, and the feasibility and reliability of the various analytic techniques proposed. Each team will assign data collection and analysis priorities as the demonstration proceeds. The team's work will reflect an understanding of the salient characteristics of the EEVD and the special requirements for evaluation associated with large-scale social demonstrations (summarized in Section II, above). In particular, a flexible and adaptive posture will be maintained so that the public policy questions and changed policy priorities can be reflected in the evaluation.

The first aggregation and analysis of data in support of detailed empirical generalizations will involve statements about the indicators

which have been selected as measures of the various outcome dimensions. This level of aggregation will be the responsibility of the professional teams.

These teams will also conduct the next level of data aggregation. For each outcome dimension, relevant indicator findings will be inspected and assessed in light of experience with the data and with problems of analysis. In each case, a descriptive statement will be formulated that elaborates key findings. An example of a format that could summarize these findings is shown in Figure IV-1.

The next step in the derivation of successively higher levels of empirical generalization will be the inspection of evaluation findings across outcome dimensions. This analysis, and all subsequent analyses, will be the responsibility of the project senior staff, composed of key professionals from each of the task teams plus the project director and his key deputy.

Figure I-3, p. 16, illustrates how the findings on program outcome dimensions will be aggregated according to selected information categories, which serve an accounting and organizing function. Reading across the rows of this matrix, we may now list the outcome dimensions that will be considered in each of these categories. The outcome dimensions that will be treated have been shown previously and are listed in a convenient form in Appendix G. Findings will be taken directly from each of the individual reporting forms for outcome dimensions as illustrated in Figure IV-1. ASC will assess the relative importance of each outcome dimension in formulating relevant conclusions in light of demonstration experience, and will draft a report summarizing key findings suggested by these comparisons. A format for this purpose is shown in Figure IV-2.

Finally, similar procedures of aggregation, inspection, weighting of importance, and formulating conclusions will be applied to the findings summarized in each category of information in order to arrive at overall conclusions related to each of the major questions of the evaluation. To reiterate, these questions, as well as the information categories, outcome dimensions, and indicators, will almost certainly

OUTCOME DIMENSION: _____		
Relevant Indicators	Summaries of Key Indicator Findings	Change from Historical and Baseline Conditions
1.		
2.		
3.		
4.		

Weighting Assigned to Various Indicators, and Rationale for Weighting:

Summary Findings: Outcome Dimension \_\_\_\_\_

Fig. IV-1

Model Display of Summary Findings: Outcome Dimensions

INFORMATION CATEGORY: _____		
Relevant Outcome Dimensions	Summaries of Key Outcome Dimension Findings	Change from Historical and Baseline Conditions
1.		
2.		
3.		
N.		
Weighting Assigned to Different Outcome Dimensions and Rationale for Weighting:		
Summary Findings: Information Category _____		

Fig. IV-2

Model Display of Summary Findings: Information Categories

be refined and amended in the light of actual experience with the forces and processes of the demonstration. We have illustrated the relationship of findings in each category of information to major questions of the evaluation, in Figure I-2, p. 13. Reading across the rows of that matrix, we may list the information categories that will be assessed in order to answer each of these questions. Table IV-1 presents this list.

At this level of aggregation, even summary statements will be complex and detailed; their presentation will not readily yield to the type of format suggested for the display of summary findings at lower levels of empirical generalization. Accordingly, findings will be presented in a less tabular mode.

#### The Need for "Fine Grain" Findings

The formats for the display of summary findings at each stage of the analysis are extremely detailed. Some might prefer that the evaluation report suppress the detail in favor of aggregative summary findings. We propose to provide generalized and summary displays and discussions. However, we emphasize again the importance of maintaining and presenting a disaggregated and fine grain description and explanation of the demonstration. Findings at all levels of generality will have implications for public policy; the nature of these implications will be determined by the specifics of the policies under consideration and the unit of government involved, whether at the federal, state, or local level. There will not be a smooth transition between successively higher levels of empirical generalization and the ability to draw public policy inferences; this end is best served by being able to inspect statements about demonstration outcomes from the mixed perspective of various levels of generalization regarding program findings.

#### POLICY OPTIONS AND INSTRUMENTS

The objectives and the range of possible outcomes of the voucher demonstration are multiple and complex, but the tools available to the policymaker are comparatively few in number, are rarely refined, and



Table IV-1

EVALUATION QUESTIONS AND INFORMATION CATEGORIES

QUESTIONS	CATEGORIES
Impact of EEVD on:	
Education of elementary school students	<ul style="list-style-type: none"> <li>Education Results</li> <li>Attitudes of practitioners</li> <li>Programs and processes</li> <li>Attributes of new schools</li> <li>Allocation of resources</li> <li>Financial impact</li> <li>Consequences beyond demonstration area</li> </ul>
Range of choice among educational programs	<ul style="list-style-type: none"> <li>Programs and processes</li> <li>Attributes of new schools</li> <li>Distribution of students</li> <li>Consequences beyond demonstration area</li> </ul>
Equality of educational opportunity	<ul style="list-style-type: none"> <li>Educational Results</li> <li>Attitudes of practitioners</li> <li>Programs and processes</li> <li>Attributes of new schools</li> <li>Distribution of students</li> <li>Allocation of resources</li> <li>Consequences beyond demonstration area</li> </ul>
Economics of public education	<ul style="list-style-type: none"> <li>Allocation of resources</li> <li>Financial impact</li> <li>Consequences beyond demonstration area</li> </ul>
Citizen-school relations	<ul style="list-style-type: none"> <li>Governance and administration</li> <li>Status of professionals</li> <li>Parent attitudes and responses</li> <li>Community attitudes and responses</li> <li>Consequences beyond demonstration area</li> </ul>
Critical social and political tensions	<ul style="list-style-type: none"> <li>Governance and administration</li> <li>Status of professionals</li> <li>Parent attitudes and responses</li> <li>Community attitudes and responses</li> <li>Consequences beyond demonstration area</li> </ul>

must be applied in complex and fluid social settings where the consequences of a given policy application are rarely predictable with high confidence. In addition, policies--or the means by which policies are to be realized--may be in conflict with one another. The multiplicity of public and private interests that may be affected by any given policy application implies that there is not likely to be any way of coming closer to the goals of one public policy without moving further away along another dimension, and that policies of "social optimization" will be impossible to devise.

These considerations emphasize the importance of securing a careful understanding of the range of public policy options and instruments that may be available, and of relating them in some systematic fashion to the findings of the evaluation. If reliable implications for public policy are to emerge from the evaluation of the EEVD, analysis must not be divorced from the decisionmaking process. Accordingly, this evaluation plan includes the following three procedures.

First, Rand will work closely with appropriate agencies of federal, state, and local government in order to clarify the public policy issues of concern, define the policy options that may be considered, and translate these policy options into operational terms. It is anticipated that this work can be of benefit both to policymakers and to evaluators. For policymakers, it can help to focus attention on the range of possibilities suggested by the demonstration, and give them time to consider the various alternatives in which they are interested. For evaluators, it can provide useful feedback from the policymaking community regarding the foci of public concern, and assist in the setting of priorities for data collection and analysis in the course of the evaluation.

Second, senior Rand evaluation staff members will monitor evaluation findings as they grow in detail and in levels of generality, and will attempt to define and describe evaluation outcomes that could be regarded as evidence in support of public policies. A range of policies will be considered, and a list of potentially feasible options will be drawn up, together with the operational implications associated with each option. This list will be refined and revised in the course of

continuing discussions with policymakers at all levels of government. For each policy option on the list, actual and possible demonstration outcomes that might provide evidence in support of a policy implementation decision will be elaborated, and the reasoning underlying their selection will be detailed.

Third, as the evaluation progresses and Rand staff come to have a growing understanding of the outcomes of the demonstration that appear probable, senior evaluation staff will reinspect the available data and the findings on outcome dimension and their indicators, in order to specify the conditions under which there would appear to be a reasonable chance for the replication of each outcome of interest to policymakers. The conditions of interest will include essential program ideas or components that must be applied, as well as the general dimensions of political, social, economic or educational conditions under which the application of such program components seem most likely to achieve desired results. Here, in particular, it will be essential to derive conceptual equivalence rather than operational equivalence as a guide to policymakers interested in program or program component replication.

## V. MANAGEMENT AND PLANNING

This section describes the major elements in the organization of the Phase II analysis and survey effort, including:

1. Organization of the work.
2. Staffing of ASC effort.
3. Schedule of work and products.
4. ASC relations with other agencies participating in EEVD, including ASC survey subcontractor.
5. Access to and privacy of data.
6. Methods of periodic review and adjustment of analytic design.

The following description is based on a Phase II effort beginning in March 1972, consisting of an eighteen-month pre-demonstration period, followed by five consecutive one-year demonstration periods to start in September 1973 at two to five demonstration sites. If at one or more sites there should be a demonstration effort beginning in September 1972, the pre-demonstration schedule described below would be compressed from eighteen months to six months for the early start sites. For other sites, the eighteen-month pre-demonstration schedule would continue to be observed.

### RAND ORGANIZATION AND STAFF

Rand's organization for Phase II of the EEVD analysis and survey contract would be as described in the Rand Phase I proposal of September 1971, with some modification resulting from changes and clarifications in the program proposed since then by OEO.

#### Introduction: Rand Management Structure, General

Before describing the proposed Rand organization for Phase II of the EEVD analysis and survey, it is useful to describe Rand's management structure.

The Rand Corporation is a nonprofit corporation, incorporated under the laws of the state of California, and performs research on national policy, strategy, and operations that affect the security of the United

States and on domestic affairs including problems of education, health care, housing, poverty, and pollution.

Rand's Board of Trustees presently consists of eighteen members. Three of these trustees are officers of the Corporation while the remaining fifteen are outstanding individuals from industry, the professions, and universities.

The management structure and organization of Rand have been designed to facilitate carrying out interdisciplinary research programs and to permit establishment of problem-oriented "centers" and "institutes" (such as the New York City-Rand Institute).<sup>\*</sup> As Fig. V-1 shows, the Rand research staff, numbering about 450, is divided among six research departments, each of which is specialized in a particular discipline (e.g., Engineering Sciences, Economics) or skill (e.g., Management Sciences). Overlapping this departmental structure is a functional program structure (e.g., Education, Health, Environment).

Each program manager is responsible for developing and maintaining a program of research and analysis centered upon a major problem area. He draws the staff for his program from the technical departments; he is directly responsible to corporate management for the quality, timeliness, and costs of his program; in him is vested authority and responsibility for budgetary control of the program. Typically, the program manager directs the efforts of several project leaders, in conjunction with whom he maintains liaison with the sponsors of the several elements of his program.

The department head is responsible for maintaining the excellence of the research staff; for carrying out basic and background research; for conducting research to develop and test new analytic tools and methods; and for supporting Rand's program-oriented research.

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<sup>\*</sup> The New York City-Rand Institute is a non-profit research institution formed primarily to conduct programs of scientific research and study, and provide reports and recommendations, relevant to the operations, planning, or administration of the city of New York. The Institute was established in 1969 as a joint venture by the city of New York and Rand as a center for the continuing application of scientific and analytic techniques to problems of urban life and local government. Its program includes work on health planning, policy, and delivery; drug abuse, housing; fire protection; criminal justice, welfare; economic development; and other city problems.

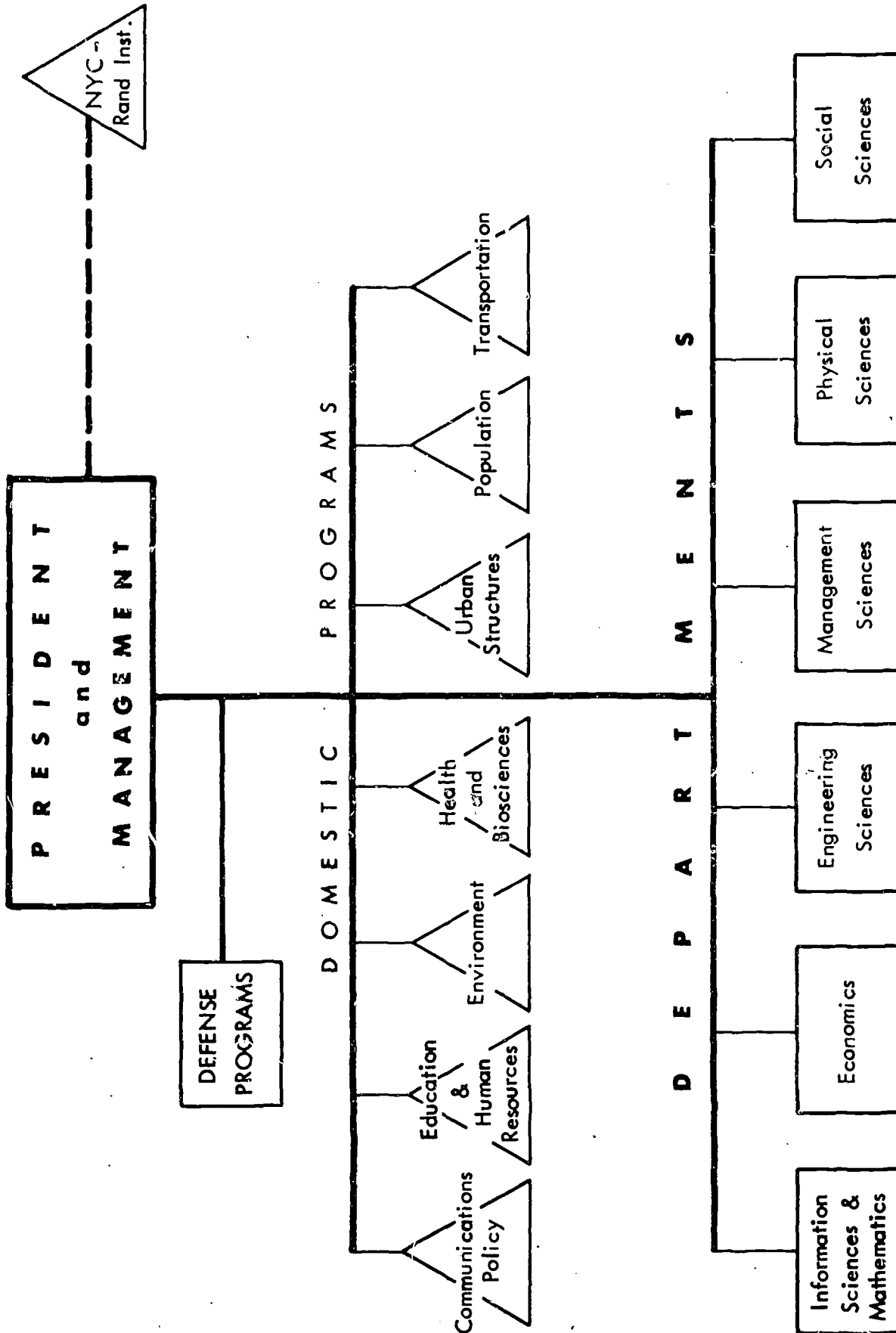


Fig. V-1--Rand organization for Domestic Research

### Rand Management Structure for Phase II

Figure V-2 shows the proposed Rand organization for Phase II, including relations with other agencies involved in EEVD. The organization of the work will be based on the approach discussed in Section III above, reflecting three elements: (1) field monitoring and surveys; (2) evaluation of the educational, social/political, and economic effects of EEVD; (3) policy implications of the evaluation.

There will be two EEVD project deputies reporting directly to Rand's program manager for education, who will devote substantial time to the project.

In each demonstration city, there will be a site director, responsible for all field monitoring and analysis in that city. He will conduct much of the observation and data gathering, and direct and coordinate the work of other Rand staff members (including community observers) and consultants in that location. He will also be responsible for coordination with EVA, ISC, and the survey subcontractor's field director in that location, as well as for assuring preparation of reports dealing with his site.

A group of senior staff specialists will work with site directors in developing the field monitoring program and jointly with the site director and survey subcontractor on survey design and review issues. One information specialist will be primarily responsible for liaison with the data management contractor.

These staff specialists, with expertise in demography, sociology, economics, psychology, education, political science, and systems analysis, will also work on the three major evaluation aspects discussed in Section III--educational, political/social, and economic. An analysis group composed of appropriate senior staff specialists and consultants will be responsible for each of the three areas and will receive technical support from Rand information science, mathematics, and statistics staff. (See Fig. V-2.)

These team members will work in all of the demonstration districts but in each district they will work with and under the supervision of the site director. This "matrix" organization will offer the advantages of

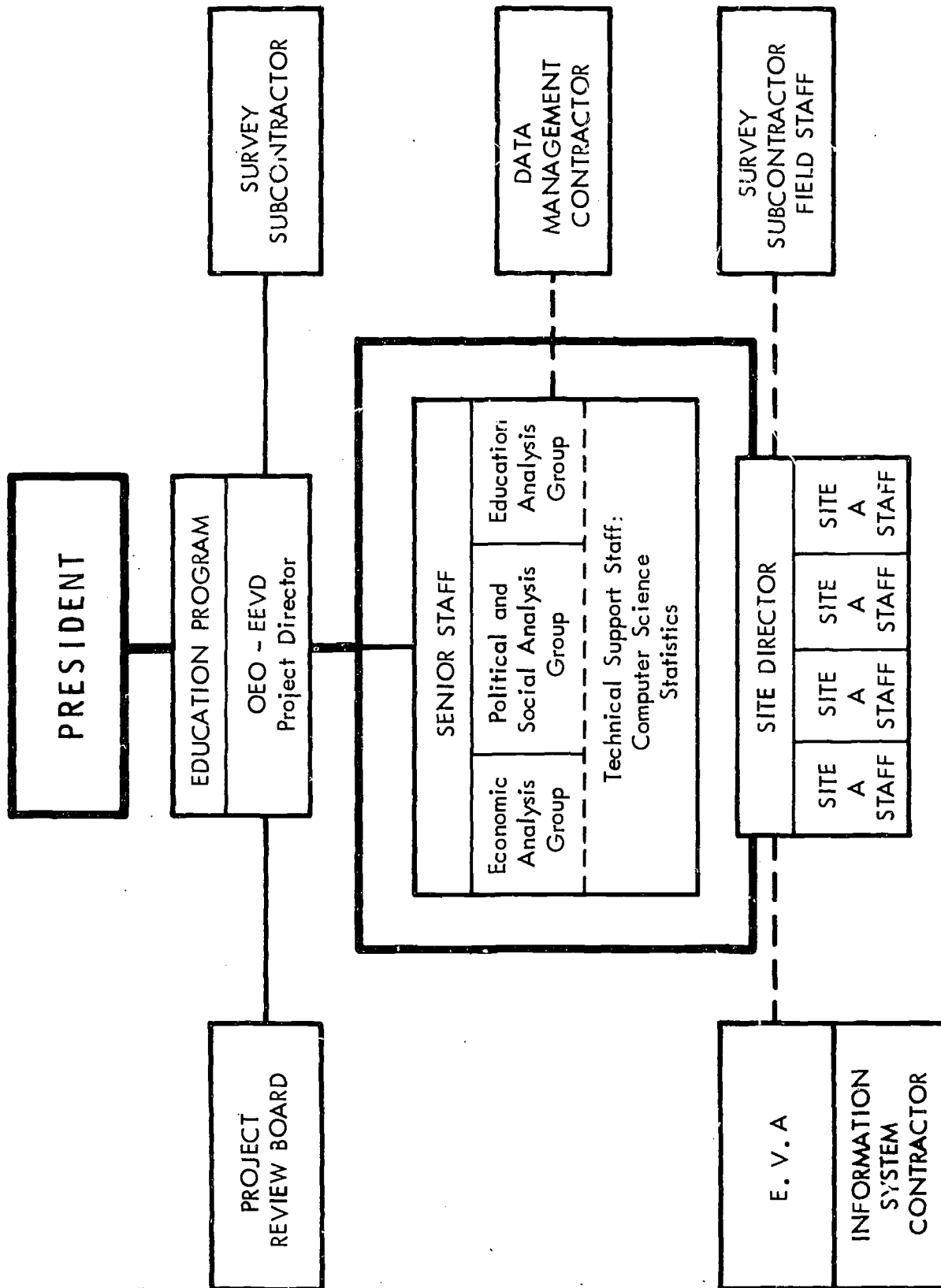


Fig. V-2-- Rand organization for EEVD--Phase II



specialist expertise, at the same time providing coordination and clear lines of responsibility.

The entire field monitoring and analysis effort will be under the supervision of the project director. He will have three prime responsibilities: liaison with OEO and other participants, coordination of on- and off-site efforts, supervision of the staff specialist teams in their analysis of the major policy issues.

A project review board will be selected composed of several Rand staff members (Robert Levine, Anthony Pascal, Roger Levien) and several other nationally recognized experts on evaluation, drawn largely from the panel who were invited to review Rand's Phase I approach in December 1971. They included David Cohen (Harvard University), Peter Rossi (Johns Hopkins), Henry Levin (Stanford), James Coleman (Johns Hopkins), Sheldon White (Harvard), Martin Rein (M.I.T.), Richard Snow (Stanford), Robert Stake (Illinois), Eleanor Sheldon (Russell Sage Foundation), Alice Rivlin (Brookings Institution), Norman Kurland (New York State Department of Education), and Harry Vakos (Minneapolis City Schools). The project review board will regularly review the progress of the work, including plans developed during the pre-demonstration period and the annual evaluation report draft. It will advise the project director on technical and policy issues as required. This function will include reviewing with the project director the need for periodic adjustment of the analytic design in light of experience. Finally, the board will itself serve an evaluation function by evaluating ASC efforts as they progress.

For those demonstration sites and comparison sites (if any) located on the West Coast, Rand would plan to keep the bulk of the team together in its Santa Monica office and travel for field work. Two community observers will be permanently stationed on site. They and the site director may require locally recruited research assistance for data collection depending on the level of information services provided by EVA, ISC, and DMC.

The tactic of clustering most of the project staff for western EEVD sites in Santa Monica would facilitate interaction among the study team members. For eastern and midwestern sites, Rand will either open local

offices or assign staff full time to existing Rand offices in Washington, D. C., and New York.

The basic organization shown in Fig. V-2 can be expanded as required to more cities than the two to five now contemplated by OEO. For a large number of cities, an intermediate regional office structure could be established with offices in two or more principal geographic regions of the country. The Field Research Corporation has assured Rand that their organizational structure permits substantial expansion of the survey capability as needed.

Appendix I lists names and qualifications of Rand staff members who would be assigned to EEVD and the functions they would be responsible for under the Analysis and Survey Contract. John Pincus, Rand's program manager for education, would continue to exercise general supervision, as in Phase I. George Hall and Daniel Weiler would act as project deputies and also lead the economic and political/social analysis groups, respectively. Marjorie Rapp and Theodore Donaldson would lead the education analysis group. Barbara Williams would be primarily responsible for collaboration with Field Research Corporation, as well as for collaboration with Daniel Weiler in leading the political/social analysis group. John Farquhar would be primarily responsible for relations with the Data Management Contractor, and would also lead the technical support effort for information flows. John Rolph would be responsible for the technical support effort in mathematics and statistics. Site directors, to be selected upon determination of actual sites, will be responsible for dealings with all agencies at the site level, for data collection and analysis pertaining to EEVD at the site, and for supervision of Rand staff and consultants on site. Resumes of senior staff are included as Appendix I.

#### SCHEDULE OF WORK AND PRODUCTS

During the Phase I period, Rand staff carried out the seven principal tasks described in the September 1971 proposal: (1) validate general approach and refine methods, with assistance of expert panel; (2) prepare sample design and survey instruments in collaboration with Field Research Corporation (see FRC report dated February 2, 1972); (3) develop plans

for information flow and processing (see below); (4) develop a cost analysis plan (see Section III above); (5) structure plans for conducting the major analysis tasks (see Sections III and IV); (6) structure approach to analysis of policy implications (see Sections II-IV); (7) set forth plans for Phase II organization and administration (included in this section).

During Phase I, Rand has refined and restructured the schedule of work and products set forth in the first volume of the Phase I proposal (pp. 42-43). The planned work program has been subdivided for expository purposes into four sets of tasks:

- o education component
- o economic and resource analysis component
- o political/social component
- o information flow component

In actual practice, there will be close interaction among the components, with outputs from one set of tasks feeding in as inputs to the other sets.

Table V-1 shows the schedule of work and products for Phase II, on the basis of an eighteen month pre-demonstration period and the first of five successive one-year demonstration periods. (This information is also summarized graphically in Appendix H.) It also shows, for each set of tasks shown in the table, estimated Rand professional staff time requirements over the first thirty months, on the basis of a single demonstration site. Additional demonstration sites would require a less than proportional increase in data analysis time and a proportional increase in data collection and observation time. There would be less than proportional increases in general management and technical support time requirements.

The tasks and professional staff requirements shown in the table are based on the assumption that a flow of data will be supplied by EVA and the Information Systems Contractor through the Data Management Contractor. In the event that these assumptions are not valid, additional Rand data collection and coordination tasks would be required, requiring an estimated 27 professional man-months during the pre-demonstration period, and 18 man-months during the first year of the demonstration period for a single demonstration site.

Table V-1

PROPOSED SCHEDULE OF WORK FOR PHASE II

(18 month Pre-Demonstration Period  
and first 12 month Demonstration Period)

<i>Task No.</i>	<i>Description of Task</i>	<i>Month (numbered from start of Phase II)</i>
	<u>1. Political and Social Components</u> <u>(Including Survey Tasks)</u>	
P/S-1	Pretest and Final Development of Baseline	
	Survey Instrument.....	1-2
P/S-2	Design and Test Pre-Demonstration Survey Instrument	2-3
P/S-3	Design and Interview Instruments for Parents, Teachers, Government Officials, Community Leaders	1-2
P/S-4	Prepare Training Program for Community Observers..	2-4
P/S-5	Recruit and Train Community Observers.....	1-7
P/S-6	Collect Documentary Historical Data.....	8-16
P/S-7	Administer Baseline Survey.....	12-13
P/S-8	Administer Initial Interviews.....	8-16
P/S-9	Organize and Process Documentary Historical Data..	16-18
P/S-10	Process Baseline Survey Data and Prepare Summary Report.....	14-15
P/S-11	Process Interview Data.....	16-18
P/S-12	Prepare Portrait of Key Pre-Demonstration Trends in Demonstration Community.....	18-19
P/S-13	Conduct Community Observation.....	8-30
P/S-14	Administer Pre-Demonstration Surveys.....	17
P/S-15	Process Pre-Demonstration Survey and Prepare Report	18-19
P/S-16	Collect Documentary Data.....	17-30
P/S-17	Code and Analyze Community Observation Data.....	10-30
P/S-18	Refine Interview Instruments.....	19-20
P/S-19	Prepare Parent/Community Survey #1.....	20-21
P/S-20	Administer Parent/Community Survey #1.....	27-28
P/S-21	Administer Follow-Up Interviews.....	26-27
P/S-22	Process Parent/Community Survey #1 and Prepare Report.....	29-30
P/S-23	Process Follow-Up Interview Data.....	28-29
P/S-24	Process Documentary Data.....	29-31
P/S-25	Aggregate Data on All Indicators and Conduct Program-Level Data Analyses.....	29-32
P/S-26	Prepare Input to Year-End Report.....	31-33

Rand Professional Staff Time Required for P/S Tasks 1-26:

Months 1-18, 36 man-months

Months 19-30, 42 man-months

Table V-1--continued

<i>Task No.</i>	<i>Description of Task</i>	<i>Month (numbered from start of Phase II)</i>
<b>2. Educational Component</b>		
E-1	Develop Scaling Procedures.....	1-6
E-2	Carry out Experimental Scales; Score and Analyze	3-12
E-3	Field Test Delphi.....	5-12
E-4	Develop Rates Instructions for Classroom Observation.....	5-8
E-5	Determine Test Battery.....	13-18
E-6	Collect Baseline Data.....	15-18
E-7	Arrange for Follow-Up of Students.....	17-18
E-8	Analyze Pre-Test Data.....	19-22
E-9	Classroom Observation.....	19-26
E-10	Prepare Interview Schedules for Teachers, Aides, Administrators.....	17-18
E-11	Conduct Interviews.....	19-26
E-12	Analyze Post-Test Data.....	27-30
E-13	Prepare Inputs for Year-End Report.....	29-31

Rand Professional Staff Time Required for E Tasks 1-13  
Months 1-18, 18 man-months  
Months 19-30, 18 man-months

<b>3. Economic and Resource Analysis Component</b>		
ERA-1	Collect Baseline and Historical Data on Market Structure, Behavior and Performance.....	1-6
ERA-2	Develop Formats For Educational Programmatic Profile Analysis.....	1-10
ERA-3	Develop Model for Resource Analysis.....	1-6
ERA-4	Develop Model for Analyzing Funding Flows.....	1-8
ERA-5	Collect Baseline Data (Programs, Resources, Funding).....	7-10, 19-22
ERA-6	Analyze Baseline Data-Develop Programmatic Profile, etc.....	9-12, 21-24
ERA-7	Test Feasibility of Formats and Models.....	9-14
ERA-8	Document Baseline Status.....	11-14, 23-26
ERA-9	Modify Formats and Procedures.....	13-16, 27-28
ERA-10	Analyze Organization of Educational Market and Competitive Conditions.....	13-16
ERA-11	Document Procedures for Tasks ERA 2-4 for Operation (input for year-end report).....	13-18
ERA-12	Document and Report Organization of Market (input for year-end report).....	17-18
ERA-13	Collect Year-End Data on Resource Use.....	17-20, 29-30
ERA-14	Analyze Changes in Resource Use.....	19-20, 31-32
ERA-15	Monitor Changes in Economic Behavior, Structure, Performance.....	19-26
ERA-16	Analyze Changes in Organization and Competitive Conditions.....	27-28
ERA-17	Document and Report History of Changes in Organization, Structure and Behavior of Educational Market(input for year-end report)..	29-30

Table V-1--continued

<i>Task No.</i>	<i>Description of Task</i>	<i>Month (numbered from start of Phase II)</i>
ERA-18	Document Program and Resource Impact (input for year-end report).....	31-33
Rand Professional Staff Time Requirements for ERA Tasks 1-18:		
Months 1-18, 15 man-months		
Months 19-30, 10 man-months		
4. <u>Information Flow Component</u>		
a. <u>Definition of Base Data Requirements</u>		
IF-1	Interaction and Specification with Research Team	1-18
IF-2	Prepare Specifications for DMC: Data Names, Field Dimensions, etc.....	1-18
IF-3	Prepare Collection Specifications (with DMC)...	5-12
IF-4	Assist DMC in Identification of Priorities and Validity Standards.....	1-4
IF-5	Interface with Repositories of Baseline Data (state, regional and local).....	1-3,7-11,16-18
b. <u>Design and Implementation of Data Accountability System</u>		
IF-6	Functional System Design.....	1-4
IF-7	Design and Production of Transmittal and Notification Forms.....	4-8
IF-8	Detailed System Design.....	5-8
IF-9	Program Coding and Checkout.....	8-11
IF-10	Program Documentation.....	10-12
IF-11	System Documentation.....	8-11
IF-12	System Test and Exercise, Using Dummy Data.....	11-17
c. <u>Identification and Design of ASC Analytical Tools</u>		
IF-13	Interaction and Initial Specification of ASC In-House Aids.....	1-18
IF-14	Modify Existing Packages.....	1-18
IF-15	Prepare Rapid Data Entry Routines for Rand Data Analysis System.....	6-12
d. <u>Demonstration Tasks - Year 1</u>		
IF-16	Maintain Data Accountability System: Receive, Screen, Issue Receipts, etc.....	19-30
IF-17	Identify Altered Requirements, Issue Change Notices, etc.....	19-30
IF-18	Spot Validity and Comprehensiveness Checks.....	20-21,25-26
IF-19	Expediting System Change and Coordination.....	19-30

Table V-1--continued

<i>Task No.</i>	<i>Description of Task</i>	<i>Month (numbered from start of Phase II)</i>
	<u>e. ASC Analytical Assistance</u>	
IF-20	Maintain Computational and Analysis Aids.....	19-30
IF-21	Prepare Additional Tools Required, Listings, etc.	19-30
Rand Staff Time Requirements for IF Tasks 1-21:		
	Months 1-18, 30 man-months	
	Months 19-30, 18 man-months	
	<u>4. Reporting Tasks</u>	
RQ1-8	Quarterly Progress Reports (not issued to coincide with annual reports).....	4,7,10,13,1 <sup>st</sup> ,22,25,28
RA1-2	Annual Progress Reports (after pre-demonstration period, and annually thereafter).....	20-32
RS1-3	Summary Report on Survey Results .....	six weeks after administration of each survey

Rand Staff Time Requirements for Reporting Included  
in Analysis Task Requirements.

### INFORMATION FLOW AND RELATIONS WITH OTHER AGENCIES

The basic ASC task in Phase II is to assure that specified data sets, quantitative and qualitative, are collected, displayed, and analyzed to cast light on the results and policy implications of EEVD. Assuring the appropriate information flow to and from ASC, while guarding the confidentiality of the data, involves both direct data generation and processing by ASC and ASC acquisition and provision of information to other agencies. The principal agencies concerned are, in addition to ASC:

- o Office of Economic Opportunity (OEO)
- o Educational Voucher Agency (EVA)
- o Information Systems Contractor (ISC)
- o Data Management Contractor (DMC)
- o EEVD technical assistance agency
- o local schools
- o state school agencies
- o agencies of local general government

This subsection discusses first the organization for requirements and procedures to assure this information flow, including continuity and confidentiality; second, the nature of proposed relations between Rand and other agencies involved in EEVD.

#### Information Flow: Requirements and Procedures

This subsection discusses the proposed mechanism for data collection and transfer, and describes the measures that must be taken by ASC to insure an orderly flow of valid information. In that the final organizational arrangement of the demonstration is yet undecided, the expected data flow and responsibilities for two eventualities are described: the first presupposes an established ISC, while the second does not.

As described by OEO personnel, school and student data will be collected by ISC, operating under the aegis of the EVA. The ISC may consist of a staff retained by the EVA, or these functions may be contracted. The data collected will be forwarded to the DMC for preparation, storage, analysis, and dissemination to the ASC and OEO. (Preparation, as the responsibility of the DMC, may occur either at the demonstration site or at a removed location.)



Generally speaking, this organizational arrangement may be described as a closed loop, with requirements definitions flowing from ASC to DMC to ISC, and data flowing in the opposite direction. These relationships are illustrated schematically in Fig. V-3. The effective performance of each "side" of the system is critical to the success of the evaluation, and will require establishment of formal monitoring and information transfer procedures. This is particularly true of the requirements definition flow, which is often neglected in consideration of this sort of information system design.

#### General Approach (Assuming Existence of ASC-Independent ISC)

The Rand effort in this general area may be divided into four overlapping tasks, as follows:

- o Definition of base data requirements (pre-demonstration)
- o Design and implementation of the Data Accountability System (pre-demonstration)
- o Identification and design of ASC analytical tools (pre-demonstration)
- o Maintaining an interface with the DMC, and facilitating data collection and dissemination.

Each of these tasks is described below, and in Table V-1, with a graphic summary shown in Appendix H. Described below is the general content of each of the four tasks, followed by a discussion of the steps necessary if Rand must also assume ISC responsibility.

Definition of Base Data Requirements. This task will involve continued preparation and refinement of the EEVD data requirements, preparation of data specifications in a form acceptable to the DMC, and participation with the DMC in establishing efficient collection procedures and identifying promising data sources. In addition, an important portion of this task (which will substantially affect the role of other parties) involves specification of data validity and accuracy requirements, and identification of those areas where evaluation results will be particularly sensitive to data validity and comprehensiveness. This exercise should lead to a judicious and well-grounded statement of collection,

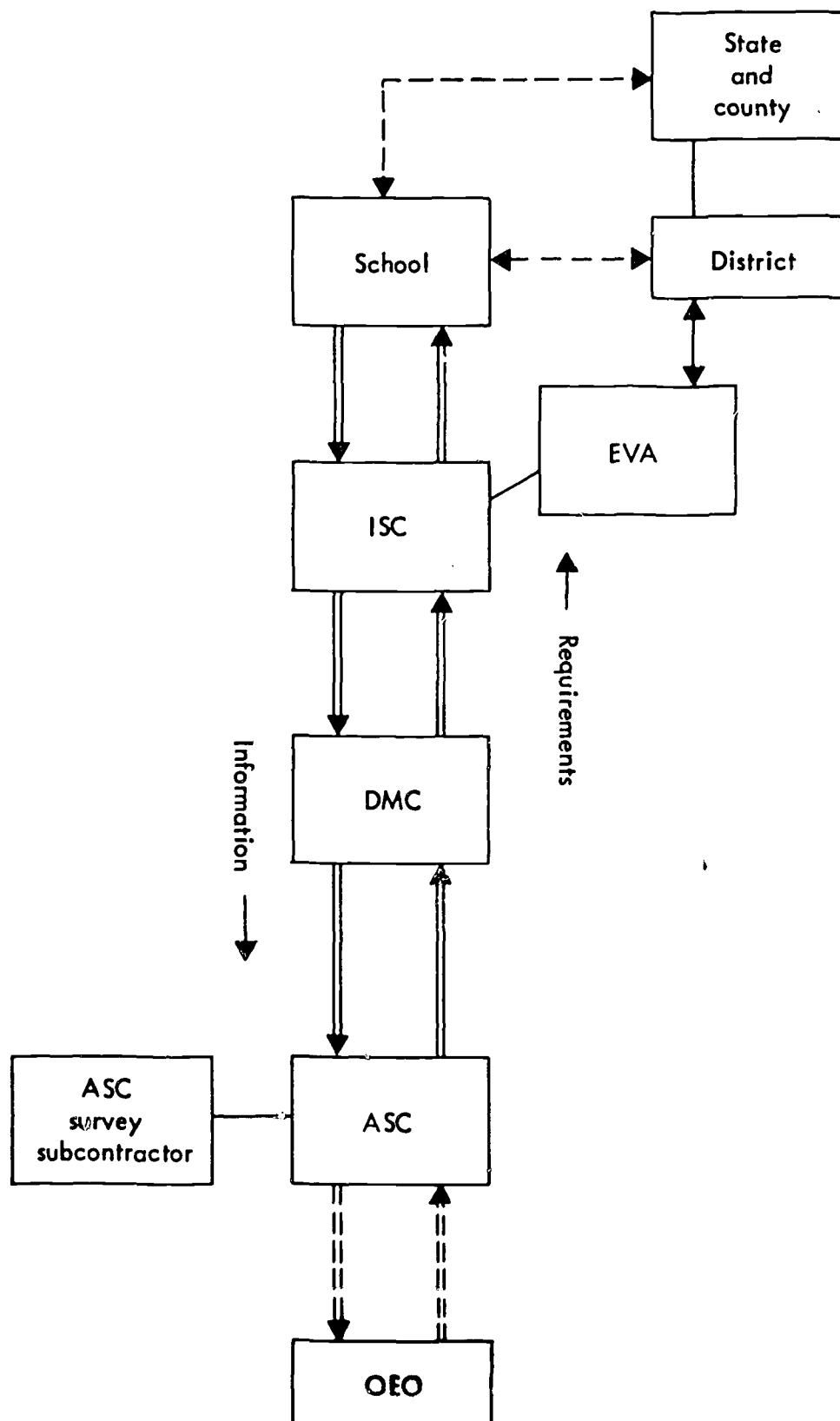


Fig.V-3—Functional data and requirements flow

retrieval and analysis priorities, with respect to both timeliness and expended effort.

Design and Implementation of the Data Accountability System. The problems of communication between ACS, DMC, and ISC are large and complex, particularly in consideration of the current flux of demonstration plans, and the volume and coverage of require data. We propose to attack these problems through design and implementation of a Data Accountability System (DAS), aimed at providing monitoring and status reports concerning the state of both information and requirements definition.

The DAS will consist of a series of procedures and programs, the latter to be implemented upon the Rand JOSS time sharing system. Briefly stated, the objectives of the system are threefold:

- o to provide, for ISC, DMC, and ASC, a master summary of all data items collected, and a digest of their dimensions;
- o to provide an efficient means of communications -- with full audit trail -- between the ASC and DMC concerning collection, dissemination, and requirements definition status;
- o to provide, to ASC researchers and OEO monitors, a rapid reference for judgment of the correspondence between research objectives and the ability of collected data to meet those objectives.

Initial definition of the data to be collected has been and will continue to be established through verbal and written communications between the ASC and the DMC. These communications will eventually result in preparation of a Master Data Summary, detailing, for each data item to be collected, the following dimensions:

- o item name
- o item description
- o data source (e.g., school, district, state)
- o collection cycle (e.g., parking-period, monthly, or specific event-orientation)
- o collection responsibility

- o item coverage (specifying, if necessary, particular schools, classrooms)
- o PRESS descriptors

The Master Data Summary will serve as the constant reference and vocabulary definition for subsequent communications between the ASC and the DMC, and a common reference between the ISC and the DMC. The existence of such a summary should minimize communication problems between the ASC and DMC, and insure that ASC requirements are accurately reported to the ISC.

Despite extensive efforts at initial specification, data requirements may be expected to change markedly as the Demonstration (and subsequent evaluation) evolves. Particular areas of interesting activity will emerge, certain data items will be recognized as invalid or unnecessary, and new sources of data will appear. For these reasons, specific procedures for alteration and updating of the Master Data Summary must exist.

The key to such changes is the Item Change Notification, issued by the ASC when addition or deletion of a data item is required, or when one of the dimensions specified above must be altered. The Item Change Notification is sent to the DMC, along with the revised Master Data Summary. Receipt of the Change Notification is acknowledged by the DMC through written communication specifying date of receipt and expected date of change implementation. Notice of final implementation of required procedural and program changes will be issued by the DMC. Verification of final implementation is the responsibility of the ASC.

The ASC will maintain the Data Accountability System through establishment of an automated system for production of summary lists, notifications, and receipts. This system will also be used to maintain a master schedule for reporting and analysis of data received. Figure V-4 summarizes the portion of the Data Accountability System dealing with requirements definition, and the associated forms and procedures.

Identification and Design of ASC Analytical Tools. This task, the third involving pre-demonstration preparation, requires final establishment of the statistical-analytic packages and routines required for

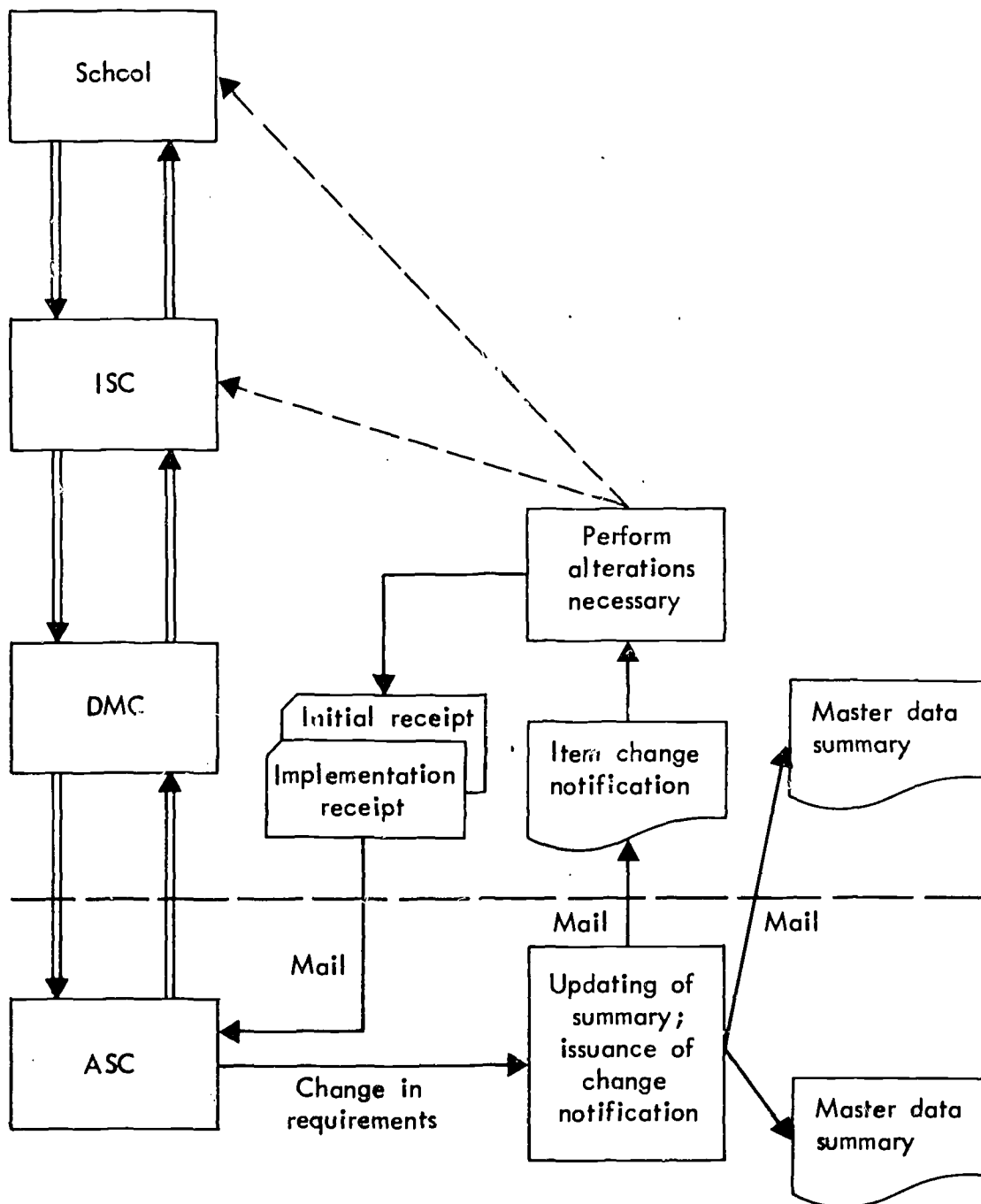


Fig. V-4 — Requirements definition flow

effective analysis. This required effort is straightforward in principle: the information specialists will confer with researchers concerning their methodological needs (usually well-defined), and will marshal and adapt the required resources.

In addition, we intend to adapt Rand's Data Analysis System for use by research team members. This system is a Rand-developed aid to users of large data bases. In the EEVD, there will often be need to facilitate interaction between the researchers and their data base. At the elementary level such interaction can decrease the cost and speed up the researcher's analytic efforts. On a more sophisticated level, increasing the interaction of researcher and data provides an opportunity to get much more from the data. The researcher can more thoroughly explore alternative hypotheses, investigate complex phenomena which do not readily lend themselves to straightforward statistical analysis, and pursue hunches and flashes of insight which might ordinarily be forgotten.

The Rand Data Analysis System aids the researcher in accessing his data and assisting him in interactively applying a wide range of analytic procedures. He is able to review the raw data in tabular or graphical form, add to or delete from the basic data base; flexibly subset, structure and restructure the data for hypothesis testing and formulation; and apply many of the standard statistical tests. Because the displayed results and transition between each analytic step are accomplished at interactive speeds, the researcher is able to get very close to his data by exploring it to a depth which has previously been impractical.

The prototype system, which is currently being production engineered for greater reliability and efficiency, offers a user the following capabilities:

1. Load large files or subsamples of large files (in a batch computer mode) from card, tape or disk;
2. File missing or undefined data in such a way that the system automatically handles it during its computation and displays;
3. Interact with the user from an on-line graphic terminal (either Rand videographics or IBM 2250) employing the

following display capabilities:

- a. raw data tabular display,
  - b. histograms and barcharts,
  - c. two-way contingency tables,
  - d. multiple linear regression with residual analysis.
4. Interact with the user to allow flexible data base sub-setting on variables, values of variables and cases; all subsets or files created in this way are saved until deletion is requested;
  5. Create undefined data when transformations are undefined;
  6. Allow subfiles to be recombined by intersection or union;
  7. Compute, save and display on command relevant summary statistics (e.g., mean, max, min, etc.)

Maintain DMC Interface. Although prompt and efficient data flow is the primary responsibility of the DMC, the ASC -- charged with ultimate responsibility for EEVD evaluation -- must fully participate in the certification procedures. These procedures involve examination of data at the school level (or initiation of "dummy" data packages through the system) and comparison with data transmitted from the DMC to the ASC. These comparisons will be carried out with random frequency and scope, toward

- o insuring that data validity is maintained at the highest reasonable level;
- o determination of new procedures, organizations, or responsibilities that are necessary for more effective data transfer.

These random samplings will be carried out in an unobtrusive manner by the ASC individuals responsible for interaction with schools.

Alternative Plan for Assigning ISC Role to ASC. At this writing, it remains possible that ASC will be asked to assume in part the role of the ISC. Should this occur, we would establish an office at each demonstration site, and assign to each a full-time employee charged with collection of the pertinent data. In substance, this eventuality would not alter the tasks described above, but would require the performance of two additional tasks:

- o ISC establishment and implementation (pre-demonstration)
- o ISC operation (demonstration)

#### ISC Establishment and Implementation

As the role of the ISC is described in the RFP, it will serve as the collection (and alternatively, preparation) agent for the EEVD. As such, it must maintain close contact with school, community, and state officials and data sources. It is our belief that the ISC function will require one full-time employee per demonstration site. The primary subtasks thus associated with establishment of the ISC will include acquisition and training of this individual, and specification -- for his continued use -- of collection mechanisms, contacts and techniques. This specification will take the form of an ASC-DMC-prepared guidebook of procedures and actions required of the ASC, including specification of collection cycles and schedules.

ISC Operation. Ongoing operation of the ISC will involve largely routine performance of the guidebook -- specified tasks, and a great deal of leg work in expediting data flow and maintaining close interfaces with community and educational data sources.

#### Confidentiality of Data

Confidentiality of data as used here refers to two issues: (1) assuring that ASC and other contractors release data to the public only as agreed by OEO and other cognizant agencies, if any; (2) assuring that data provided to researchers in confidence is kept confidential.

The first issue is normally handled by contractual agreements between the research sponsor and contractor, supplemented and altered as necessary by formal and informal agreement. In the case of EEVD, this practice would presumably be followed in OEO contracts with ASC and DMC. In addition, for certain kinds of data, supplementary agreements with EVA might be desirable.

The second issue, assuring the confidentiality and privacy of data sources, can create extremely difficult problems. In some cases, the



subpoena power has been used to require researchers to provide information about people's history, opinions, etc., that was originally transmitted to them in confidence. Since the researcher -- and in some cases his sponsor -- normally assures respondents that confidential information will not be divulged, major ethical and legal problems may arise when such information is divulged for whatever reason -- careless talk by people with access to data, poor communication of safeguard rules within the research project, theft of files, or legal action to make the files available to investigative bodies and parties to court action, etc.

Rand's general response to this problem in the case of EEVD will be to assure that no link exists between confidential information received and the identity of the people it refers to. In practice, this means that we will not conduct panel sampling in our survey work. Instead, we will sample de novo for each survey, and destroy names and address lists after each survey is administered. Thus not even the clerks who code survey information will know who the information refers to. Nor will interviewers or survey supervisors be able to relate survey information to specific sources after the fact.

This approach naturally involves some costs. If one can maintain names associated with data, it is usually possible to check a number of interactions among variables -- for example, the relations between parent attitudes and children's achievement in school. However, in the case of EEVD, the benefits to be gained from identifying individuals do not seem worth the risks of possible disclosure, or the elaborate safeguards involved in so-called "link systems."\*

#### Relations with Other Agencies

The preceding discussion refers to the transmission and protection of data acquired through direct collection or through other agencies. In practice, if an organization is conducting a large scale study involving

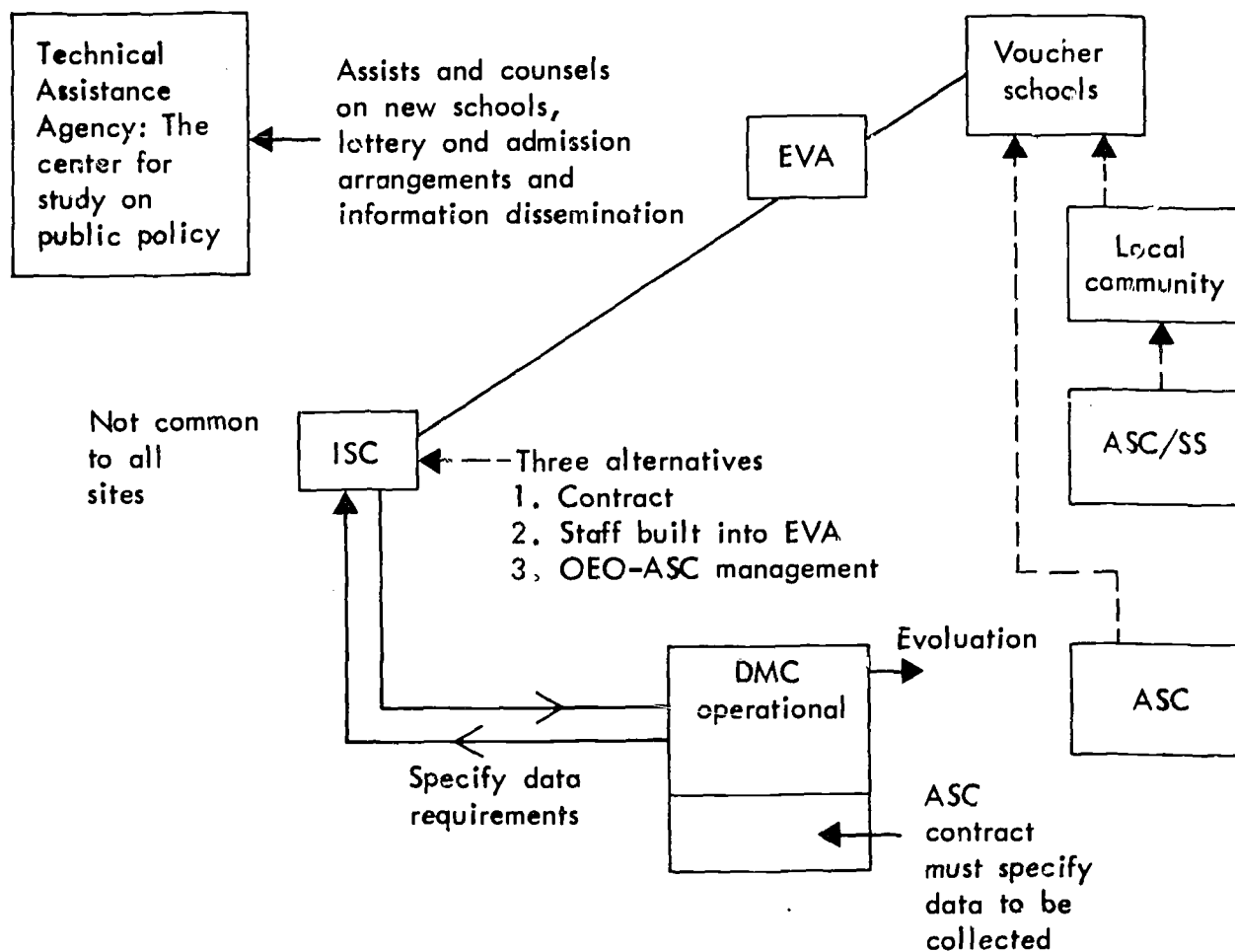
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\* Alexander W. Astin and Robert F. Boruch, "A Link System for Assuring Confidentiality of Research Data in Longitudinal Studies," Review of Educational Research, November 1970, pp. 615-624.

data collection, processing, analysis and dissemination, relations with other agencies will tend to revolve around information access issues. This is likely to be the pattern for agencies participating in EEVD. In view of the controversial nature of educational vouchers, and the consequent uncertainties in planning and administration, some special aspects are likely to arise, affecting the information flow.

For example, OEO is unlikely to find a school district that is willing to implement EEVD exactly along the lines proposed by the Center for the Study of Public Policy or by the OEO Requests for Proposal in connection with EEVD. Therefore, arrangements with each district participating in EEVD are likely to be negotiated. Each district will make its participation in EEVD contingent on certain conditions, some of which are likely to be inconsistent with the OEO design for EEVD. For example, local educational agencies may be unwilling to allow the free flow of information from EVA to ASC, or OEO. Or in the event that OEO does negotiate agreement on these issues with local authorities, EVA may subsequently decide that the political situation does not permit the free flow of information previously agreed on. Or EVA may find that the pressure of events does not allow the establishment of an effective ISC. In any of these events, the functions of ASC would be seriously affected. In the first case, there might be no real role for ASC. In the second case, OEO would have to balance the merits of dropping its support of EEVD against the gains from allowing the project to continue on terms that would limit the information flow -- terms that might drastically restrict the roles of DMC and ASC. In the third case, the roles of ASC and DMC might have to be substantially expanded in order to fill in for the absence of an effective ISC operation.

Therefore, Rand expects the exact definition of the ASC role and relations with other agencies to vary according to the situation at each demonstration site. It is not possible to foresee the precise set of roles and relationships in advance. However, Figure V-5 shows a tentative arrangement, previously discussed with OEO, under which EVA/ISC would be the primary data source for ASC, with the intermediary of DMC. This arrangement would allow for independent ASC access through the



EVA - Educational Voucher Agency  
 ISC - Information System Contractor  
 DMC - Data Management Contractor  
 ASC - Analysis and Survey Contractor  
 ASC/SS - Survey Subcontractor

Fig. V-5 —Organizational arrangements for EEVD

survey subcontractor, and direct ASC dealings with the schools (classroom observations, interviews, etc.).

Under an arrangement of this kind, Rand would plan the following liaison arrangements:

OEO -- Project director and deputy (John Pincus, George Hall)

Survey Subcontractor -- Senior staff member (Barbara Williams)  
and at field level, site director

Data Management Contractor -- Senior staff member (John Farquhar)

Information Systems Contractor -- Senior staff member (Barbara Williams and Milbrey McLaughlin) and site director

Educational Voucher Agency -- Site director\*

Technical Assistance Agency -- Site director

Voucher Schools -- Senior staff member (Marjorie Rapp) and site director

Local Government Agencies -- Deputy project director (Daniel Weiler) and site director

One special set of relationships with local agencies merits particular discussion -- the relationship between formative and summative evaluation. The ASC task is primarily summative in that it is largely designed to report on outcomes. But EVA at each site will need to conduct, directly or under contract, formative evaluations aimed at: (1) evaluating alternative program goals and methods; (2) defining appropriate degree of parental choice and control; (3) evaluating EVA operation, including relations with schools and parents. These elements are a necessary part of the formulation and progressive revision of EEVD at the local level.

These formative evaluations and the issues that arise during their conduct are of considerable interest to ASC. Therefore, ASC should make arrangements to receive, through EVA, copies of the documentation produced by the local evaluation effort. It may be expected that ASC will

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\* If EVA carries out ISC role directly, then ISC liaison arrangements would apply to EVA.

be interested in having the local evaluator perform special tasks or adapt its methodology to ASC perceptions of research design. Despite the attractiveness to ASC of using local evaluators as an additional resource, Rand would attempt to avoid excessive content and influence over EVA-sponsored evaluations. In a sense, the local evaluations are part of the experiment and the ASC should not attempt to affect them. Furthermore, it is important for ASC to remain unobtrusive and avoid being identified with any particular view or group.

The importance of unobtrusiveness applies to ASC dealings with all EEVD agencies and participants. The ASC should rely primarily on public data and other participating agencies for information sources, focusing its direct information-gathering activities on those aspects where it is impractical to use intermediaries.

A tentative definition of information channels might be as follows, as previously discussed with OEO.

1. EVA - responsible for the EEVD locally, focus of information flows about schools
2. ISC - reports to EVA and ASC/DMC.
3. TAA - reports to EVA and OEO.
4. DMC - provided data by ISC (et al.) as required by ASC (EVA).
5. ASC -
  - a. Works with ISC to specify data needs
  - b. Establishes in consultation with OEO hypothesis to be tested.
  - c. Conducts with EVA approval, observations, etc. in school and community.
  - d. With subcontractor conducts survey of community, parents, etc.
  - e. Specifies cognitive test batteries and noncognitive measures for EVA.
  - f. Avoids involvement at district levels prematurely.
  - g. Makes sure that data flow system from ISC and DMC meets ASC needs, through intermittent verification of data.
  - h. Supplements data from ISC/DMC as required for evaluations.

## REPORTS

The proposed reporting schedule is shown in Table V-1, above. The reporting system, in addition to providing summary survey and interview data as required by OEO, will be designed to cover the basic elements of the evaluation as discussed in Sections III and IV. The first major report at the end of the pre-demonstration period will include:

- o Analysis of baseline and pre-demonstration surveys
- o Analysis of historical and baseline data -- educational, political/social, and economic
- o Detailed plan for EEVD evaluation procedure including hypotheses, data sources, and analytical methods

Annual reports on EEVD during the demonstration period will include:

- o Analysis of the parent/community surveys and their relation to pre-demonstration surveys
- o Analysis of educational, political/social, and economic effects
- o Analysis of policy implications
- o Proposed revisions of analysis plan in light of experience

The formal quarterly and annual reporting system is only one part of the proposed system of communications with OEO. Rand would expect to maintain regular informal communications with OEO, adjusting the evaluation design and schedule as mutually agreed, and keeping OEO currently informed of the progress of the work, notably the results of surveys, interviews, and evaluation analyses that might have a particular bearing on the conduct of EEVD.

As noted above, Rand reports would not be disseminated to other agencies and the public except under the terms of agreements with OEO.

## RAND FACILITIES

This section provides information about Rand's physical plant and equipment, notably the computer facility, as previously submitted to OEO.

### Office Facilities

The Rand Corporation owns its office building in Santa Monica, California, comprising 272,000 square feet of space, in which it houses approximately 1,125 employees. As part of this building, Rand maintains one of the largest special libraries in California; its holdings include some 50,000 books, 250,000 reports, and 2,700 periodicals. Rand also maintains an office in Washington, D.C., and it staffs and administers the New York City-Rand Institute.

### Computing Facilities

The Rand Computation Center maintains a wide variety of computing machinery, programs, and user support. The computer systems available are summarized below. In this project, the machine primarily utilized will be an IBM 360/65; the other facilities of the Computation Center will be drawn upon as needed.

### Systems

- a. IBM 360/65. The 360/65 is Rand's primary computing system. Programs are processed under a monitor system called OS/360, which offers the following utility programs and programming languages:

ALGOL	(International Algorithmic Language)
ASM	(Assembler Language)
BASIC	(Batch-mode Processor of BASIC--simplified algebraic language--programs)
BIOMED	(Statistical programs from UCLA)
COBOL	(Common Business Oriented Language)
CPS	(Conversational Programming System)
CSMP	(Continuous Systems Modeling Program)
FORMAC	(Formula Manipulation Compiler)
FORTTRAN	(FORmula TRANslator)

GPSS	(General Purpose Simulation System)
IGS	(Integrated Graphics System for the S-C 4060 and for the Video Graphics System)
MARK IV	(File Management System)
MARVEL	(Language for manipulating data in tabular arrays)
MATLAN	(System/360 Matrix Language)
MPS	(Mathematical Programming System)
PERSUB	(Matrix-Oriented statistical data analysis sub- routines)
PL/I	(Programming Language I)
RPG	(Report Program Generator)
SIMSCRIPT I.5 and II	
SORT/MERGE	(Data file sorting and merging program)
SPSS	(Statistical Package for the Social Sciences)
SSP	(Scientific Subroutine Package)
TSP	(Time Series Processor)

- b. IBM 360/20. The 360/20 is primarily used as a card-processing machine, which prints, reproduces, sorts, interprets, and collates card decks.
- c. JOSS (PDP-6). JOSS is Rand's interactive, time-shared computer system designed for small numerical problems. JOSS consoles are connected to the system either over internal Rand telephone lines from special office plugs, or remotely by standard data-communications equipment. Some remote use is by authorized teletypes. The system resides in a Digital Equipment Corporation PDP-6 computer.
- d. S-C 4060. The Stromberg Datagrphix (Stromberg-Carlson) 4060 Stored Program Recording System translates digital data into alphanumeric and graphic data, and records the results on micro-film and, optionally, on paper.
- e. CDC 6600. This computer is located at Aerospace Corporation and is available for use by Rand. It is appropriate for (1) 6600 programs obtained outside Rand which require prohibitive efforts to convert to the 360/65, and (2) problems requiring the special accuracy provided by the 60-bit word length of the 6600.



Interactive Systems on the 360/65

- a. System Name: Video Graphics. Description: The Rand Video Graphics System consists of a number of low-cost personal, TV-like graphic terminals within the Rand building, and their associated software. The system provides access to a range of computers, with a high level of interaction between the user and his program. Such interaction includes writing, editing, and compiling programs; testing and debugging programs; observing programs during execution; communicating with the batch-processing system; and preparing S-C 4060 output.

The Rand Video Graphics Project has developed software to exploit the capabilities of inexpensive graphic hardware for a wide range of programmers and non-programmers. It is expected that such graphic terminals will eventually be the principal means of communication with Rand's computers.

- b. System Name: CPS. CPS is the Conversational Programming System distributed as a Type III program by IBM. CPS, a time-sharing system combining many of the features of JOSS (incremental compiler, line editing) with the language and power of System/360, consists of typewriter terminals, an incremental PL/I subset compiler, and facilities for creating files, editing, and submitting jobs into the batch system.

CPS has been installed on the 360/65 with access via typewriter and Video Graphic terminals. Rand has modified CPS to provide full graphics capabilities including the display of graphics on a Video Graphics terminal and the input of data through data tablets and light pens.

- c. System Name: BIOMOD. Description: BIOMOD is an operational system designed to enable unsophisticated computer users to study models of biological and other dynamic systems through model construction and simulation. It operates on the 360/65 via a Video Graphics console that includes a data Tablet. A user constructs a model by drawing block diagrams and hand-printing or typing text while receiving immediate feedback

about the interpretation of his actions. Each component of a model block diagram may be defined either by another block diagram, or by one of the other user-oriented languages: analog-computer-like elements, algebraic, differential or chemical equations, or Fortran statements. During model simulation, displayed curves are continually and automatically updated; the user may stop the simulation and plot different variables, change scales and/or parameter values, and then continue the simulation.

- d. System Name: Data Analysis System. Description: The data analysis system is designed to aid a researcher in accessing his data and to assist him in interactively applying an array of analytic procedures from a Video Graphic terminal. The system may be used to review raw data in tabular or graphical format; restructure a data base by sub-setting on cases, variables or data values; and apply standard statistical models for hypothesis testing and formulation. Because the system provides on-line access to a data base and many steps in an analysis proceed at interactive speeds, a researcher is able to intimately explore his data to a depth which has previously been impractical.

## Appendix A

### EVALUATION OBJECTIVES AND METHODS: A BIBLIOGRAPHICAL NOTE

In the course of preparing the EEVD evaluation plan, we selectively consulted the literature on the evaluation of social action programs. There were two problems that we sought to clarify. The first was the objectives of the evaluation. The second was the adoption of an appropriate approach to the research design. In formulating our evaluation plan, we utilized this literature as a basis for assessing the relevance and validity of our approach.

The appended bibliography is a selective list of the materials consulted. Two compendiums of readings (Caro 1971 and Weiss 1971) on evaluation research are now available, both of which contain overview introductions reviewing the "state of the art," plus bibliographies.

The books by Williams (1971a) and Rivlin (1971) provide a historical perspective on the requirements of the kind of evaluation research which is useful in assessing alternative policy considerations. Williams (1971b) addresses the problems which must be confronted in conducting large-scale evaluation projects.

The methodological issues can be most readily identified by a careful reading of Weiss and Rein (1970) and Campbell's comment (1970). Cohen (1970) has elaborated on Weiss and Rein in his assessment of evaluations of education programs. (Also see Campbell 1971, and 1969.)

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## Appendix B

### A FURTHER NOTE ON SURVEYS

Social survey research is probably the most common, although not the most standardized, form of data collection for acquiring reliable generalizations about the knowledge, beliefs, preferences, intentions, and experiences of specified subsets of the general population. Standardized items and scales do exist in survey literature, but they are limited to certain subsets of the population and particular research interests. Surveys in large scale social demonstrations typically have more complex data requirements than can be served by existing standardized items, and must therefore contain items suited to new populations and measurement requirements.

The validity and reliability of survey data depend primarily on the quality of: (1) conceptualization of the research problem, (2) survey items, (3) sampling design, (4) techniques of administering the survey instrument, and (5) techniques for analyzing and interpreting the survey results. We have discussed items 1, 3, 4, and 5 in the body of the text and in the report, Survey Research Specifications and Baseline Survey Instrument (Field Research Corporation, February 2, 1972) previously submitted to OEO. Here we want to present some of the considerations that shaped the development of the survey items and summarize the results of the pretest of the draft survey instrument.

#### DEVELOPMENT OF THE SURVEY INSTRUMENT

Surveys that must collect complex data on a wide range of items are always difficult, particularly among poor people. Word meanings, conceptual styles, the sense of what is important, the sense of what is private vary considerably between income groups, and within income groups over time; historical events in the community can create new sensitivities and new ways of conceptualizing old ideas in a respondent population. Middle income people most frequently devise the survey instruments which are applied to lower income people, so that disparities of interpretation between questions and answers are almost inevitable. This particular problem has been frequently discussed in survey literature and does not

need explication here. What is important are the ways in which we have tried to make questions meaningful to respondents and their answers meaningful to us.

Past experience is one of the first aids to the construction of new survey instruments and we did make use of instruments which had been used in other program evaluations, together with the conventional wisdom that has developed around interviewing poor people. However, conventional wisdom is less rich for chicano respondents than for black and white low income populations. Experience suggests that chicano respondents yield disproportionate numbers of "don't know" answers and answers which seem intended primarily to satisfy the interviewer. Though part of the reason is certainly a language problem diminished by careful translation of the survey instrument into Spanish, the problem remains even when local people conduct the interviews in Spanish. Our best insight from discussions with people knowledgeable about chicano communities was that direct answers to a structured set of questions are, in form, alien to the interaction and conceptual style of Spanish speaking cultures. That suggests the most appropriate interviewing style in chicano communities would be a very unstructured, indirect conversational flow between interviewer and respondent . . . a style impossible to use in a study of this type. We have compromised by including more open-ended questions than we originally intended and have begun the interview with questions about children, which is one of the most interesting things for parents to talk about.

Our first pretest was done with about 20 respondents; the majority were chicanos from low income areas. Its results were used to eliminate items that were intolerable to the respondents, to discover flaws in the ordering and wording of questions, and to test the length of the instrument. The major results of that pretest are reported below. We intend to do a second pretest of the instrument early in the eighteen month planning period. It will be done with 75 to 100 respondents and with purposes: (1) to test the translations of the instrument into Spanish, (2) to continue to smooth the instrument, (3) to develop codes which can be used by interviewers in many of the open-ended questions, (4) to eliminate items that are too insensitive to pick up distributions.

### RESULTS OF FIRST PRETEST

The average length of the interview was over two hours. This obviously must be cut, although it was heartening to note that the quality of response did not seem to suffer adversely from respondent fatigue. For example, some of the best responses to the open-ends came on pages 17 and 18 of the survey form--more than midway through the interview. Though interviewers were distressed by the length of the instrument, they found it interesting to administer and sufficiently varied to hold respondent interest. We plan to reduce the baseline instrument to an hour and a half by the question elimination and precoding that will result from the second pretest. We have already eliminated a long series of "personal control" items because the respondents could not relate to the wording and refused to answer them.

The flow of the instrument was satisfactory. The series on children and the series in which respondents rated schools on a ladder from best to worst were especially popular. This is quite interesting in that respondents were not able to relate to questions which asked, "Which is the best school; which is the worst school"; they could place them relative to one another, however.

Many of the questions seemed "wordy" both to the interviewers and to the respondents. Tolerance for listening is apparently low among the respondents. Most "word" problems, however, seemed to be associated with language use. For chicano respondents, translation of the instrument into Spanish is the obvious solution.

Some interesting substantive issues came to our attention during the pretest--all verifying the point that final surveys should be constructed in the context of the community in which they will be given and close to the time they will be given.

- o There were many special programs and special classes in the area of San Jose where the pretest was done, meaning that children are bused from one school to another with some frequency. This gives parents experience with more than one school and complicates opinions about particular schools and their offerings.



- o The greatest antagorisms toward schools involved split shifts and split classes.
- o We will have to include questions about Spanish-speaking teachers in addition to those on the ethnic identity of teachers; for the chicanos, language is often more important than ethnic affiliation. Further, some parents thought that ethnic identity between students, teachers, and administrators not only "didn't help," but actually was a bad thing; we will have to precode that response.
- o Respondents have strong images of public and parochial schools and would tolerate more detailed questions than we have about them. (It is not obvious that we need more detailed information.)
- o The items (volunteered) that would cause parents to change their children's schools ranged from teacher quality, type of students, number of students, classroom scheduling, lunch program, to access to toilets.
- o The answers to the question series on political mobilization (Nos. 88-92 in the draft survey instrument) show the usefulness of interviewing both husband and wife where possible. Sometimes the wife would not do any of the things but her husband would do all of them.

#### PRE-DEMONSTRATION AND YEARLY SURVEY INSTRUMENTS

While the baseline survey instrument contains the majority of items that will appear in succeeding surveys, it should be noted that these later surveys will have to include questions relating to the specific experience of parents with the EEVD, including their contracts with the EVA and their use of and experiences with EEVD options. These questions should add about 20 minutes to the baseline instrument, making a pre-demonstration instrument approximately an hour and fifty minutes in length. Survey costs have been estimated on the basis of a 110 minute interview, but we will make every effort to reduce the length. Items that can be deleted from the pre-demonstration instrument should be indicated in the first analysis of the baseline survey results, for example.

Additions to the survey instruments may also be necessary from time to time. These instruments must be flexible enough to include modifications required by unanticipated events as the demonstration proceeds.

## Appendix C

### PROGRAM AND RESOURCE ANALYSIS IN EDUCATIONAL PLANNING\*

#### INTRODUCTION

Any examination of alternative educational programs must be concerned with their effectiveness and cost. Because student performance is one of the measures of the effectiveness of the program, a great deal of attention is being given to the problems of setting criteria of achievement and measuring educational outcome. Less attention has been paid to the equally demanding task of estimating and analyzing the cost of educational programs. If the instructional strategy of new programs is to be successfully utilized by educational planners, information about the cost as well as the effectiveness must be available to the decisionmaker.

This paper explores the conceptual and methodological basis of cost analysis and develops a planning cost model for estimating program cost for use in evaluating alternative programs and in pre-implementation planning for future programs. The planning cost model with its supporting cost analysis methodology provides a consistent basis for estimating the dollar cost of educational programs. The development of the model was undertaken because the current state of the art in costing educational programs does not provide a comparable basis for evaluating alternative programs. The usual practice is to give the cost per student for a program with no indication of what is included in the cost.

When the cost per unit of achievement is used, both the cost and the effectiveness measurement problems are severe. *Education Turnkey News* has drawn attention to several aspects of using this ratio:

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\* This appendix has been published separately as, "Program Cost Analysis in Educational Planning," Sue A. Haggart, P-4744, December 1971.

Even when accurate costs are obtained, it is difficult to compare them with school costs to see which is less, since school costs are kept and reported differently. The comparisons may reveal nothing more than different figures, especially since the firms [performance contractors in the context of this quotation] may depreciate certain items much more rapidly than schools.... It is even more difficult to try to contrast effectiveness with cost. If effectiveness is reported in tenths of a year's achievement, which some statisticians feel is cutting it too closely, and that figure is divided into cost data which is part hidden and part hypothetical, what does the public get? Will a school board really base a major decision on curricular changes on such a "cost per unit of achievement" figure?\*

The ratios of cost per student and of cost per unit of achievement are widely used, probably because of the false confidence the "number" engenders and the relative ease with which it can be generated. In most instances, either ratio masquerades as the output of cost-effectiveness analysis. Wisely used, cost-effectiveness analysis of educational programs produces several outputs--the aspects of cost, the measures of effectiveness, and the *relationships between cost and effectiveness*. The problems and the appropriate use of cost-effectiveness analysis in educational planning have been discussed in *Cost-Effectiveness Analysis for Educational Planning*.<sup>†</sup> Only very seldom is a ratio of cost per student or cost per unit achievement the appropriate end result of a cost-effectiveness analysis.

The planning cost model and its supporting methodology of educational program cost analysis provide a solid basis for resolving, at least in part, the problems encountered in determining the "cost" of educational programs. The planning cost model assists in developing comparable cost estimates of alternative programs. In this way, the model directly addresses the problems inherent in using an undefined cost per student in evaluation of different programs.

In estimating the program cost to be used in *comparing programs*, the resources available within a specific district or assets inherited

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\*Reed Martin and Peter Briggs, *Education Turnkey News*, February-March 1971.

<sup>†</sup>*Cost-Effectiveness Analysis for Educational Planning*, M. B. Carpenter and S.A. Haggart, The Rand Corporation, P-4327, March 20, 1970; also reprinted in *Educational Technology*, October 1970, pp. 26-30.

from discontinued programs are *not* taken into account, and a standard price for common resources, such as teachers, is used. The resulting estimated program cost is identified as the *comparable replication cost*. It is, in essence, a comparable cost that normalizes the cost of programs.

In estimating the program cost to be used in deciding whether or not a particular program can be implemented in a specific district, the resources available within the district and district-specific prices for these resources must both be determined. The resulting estimated program cost in this case is the *incremental cost* to the district.

The role of the planning cost model in estimating both the comparable replication cost and the incremental cost is pictured in Fig. 1. In this process, the first step, common to estimating either the comparable replication cost or the incremental cost, is a definition of the program in terms of its objectives, its students, and its resource requirements. These resource requirements are translated into the type of program cost estimate relevant to the decision to be made. The planning cost model, by providing a consistent methodology for estimating program cost, helps insure cost comparability among programs for decisionmaking purposes.

Before describing the planning cost model, a short discussion of the concepts and techniques of cost analysis underlying the development of the model should be helpful. The use of the model in estimating the comparable replication cost and the incremental cost is illustrated in the final part.

### COST ANALYSIS

Cost analysis is concerned with the determination of physical resource requirements for the program, with calculating the program dollar cost, and with systematically evaluating the impact of changes in the program on both the resources needed and their dollar cost. The approach is to first determine the facilities, staff, equipment, materials, and services needed to conduct the educational program and to then translate these resource requirements into an estimated program cost. This sequence forces explicit consideration of the varying resource requirements for different programs or for changes in program scope.

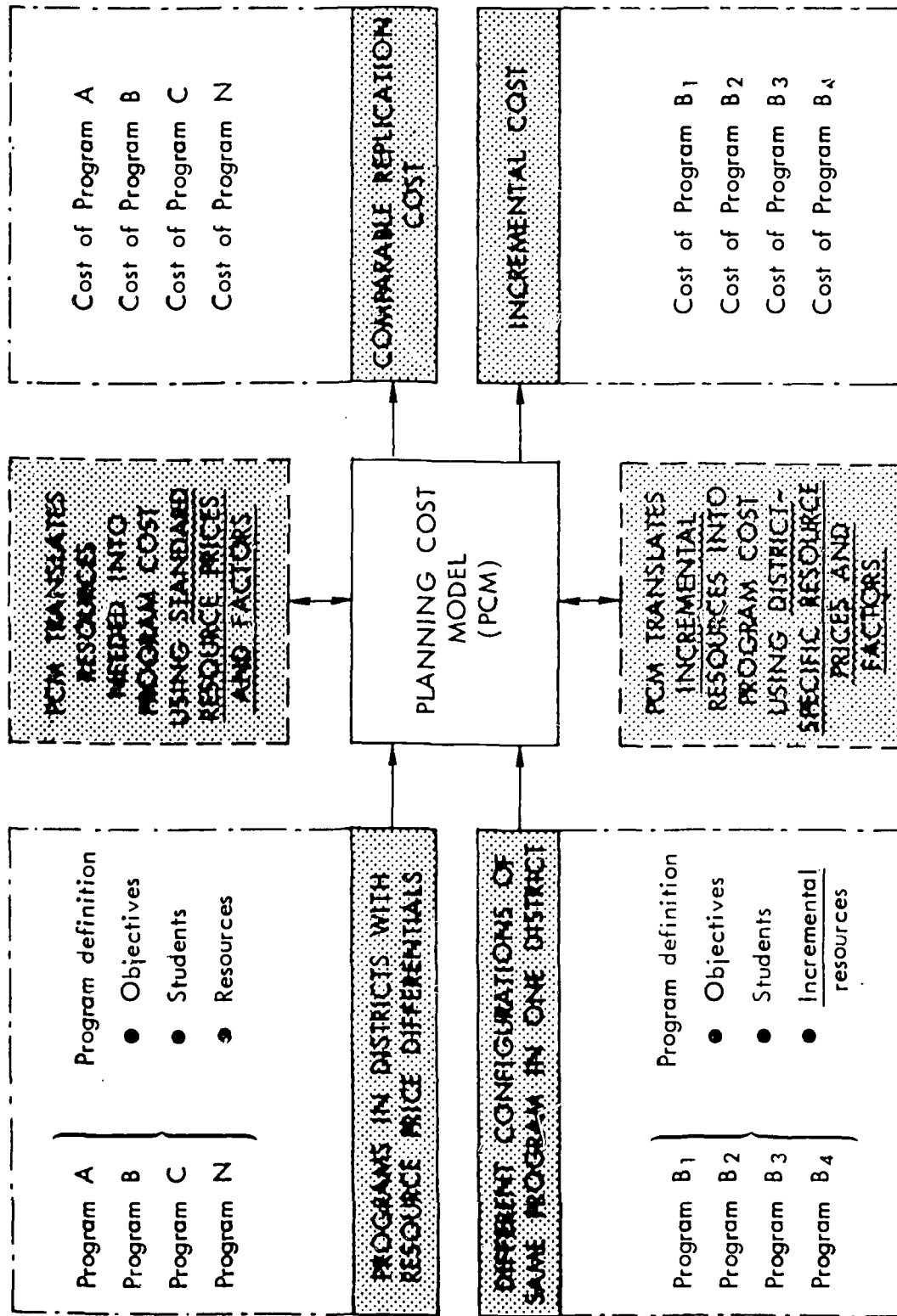


Fig. 1— Process of estimating the comparable replication cost and the incremental cost of programs

The educational program has as its core an instructional strategy. This instructional strategy includes both the resources and the way in which the resources are used to produce the educational outcome.

#### Definition of the Educational Program

The first step in analyzing the resource requirements and cost of a program is the definition of the program. The quality of the estimate of the cost of an educational program depends on the completeness with which the resource requirements of the program are determined. This determination, in turn, depends on the description of the educational program. The sequence of events then begins with a description of what the program is and how the program works and continues with a determination of the quality and quantity of the resources. These resource requirements are translated into an estimate of the program dollar cost. In defining the program, the types and magnitude of support activities or services also need to be identified.

#### Determination of Resource Requirements

The definition of the educational program is followed by the determination of the resource requirements. The data required are arrayed in the illustrative format of Fig. 2. Some of the categories in Fig. 2 pertain to resources directly. Others are "functional packages," such as training, which are combinations of resource items. Additional data should be provided as appropriate for specific programs. Each of the items in the format will be defined in terms of the kind of information needed.

Data about the characteristics of the students served and the number of students in the program will, of course, be the same data required for the evaluation of the effectiveness of the program. Data on other district conditions that might have an effect on the outcome, such as income level, turnover rate, or mobility, should be provided. The instructional time should be given, along with other information that relates to determining the actual time spent with subgroups of students or individual students. The student-teacher ratio is usually used as a proxy for this, but an effort should be made to refine this piece of information.

Characteristics of Students Served

Number of Students

Instructional Data

Class time

Class size

Facilities

Space

Students/classroom/day

Utilization

Furnishings

Staffing

Teachers

Special teachers

Paraprofessionals

Other personnel

Equipment

Program-related

Student-related

Materials

Program-related

Student-related

Pre-service Training

In-service Training

Other Support

*Fig. 2--Format for program and resource information*

In describing the facilities needed, the space requirements, including mobile or portable classrooms, laboratories, and their utilization rates, should be carefully **determined**. The requirements for non-school facilities should also be stated. The special needs for electrical outlets, air conditioning, carpeting, and lighting should be identified. Furniture needs are to be specified, identifying any special per-student requirements.



Staffing for the program should be described in terms of the qualifications needed as well as in terms of number (e.g., give number of certificated or certified teachers, the number of special teachers, paraprofessional staff, and other personnel involved in the program). If a staff member works less than full time, the percent of time involved should be given. Staff requirements for time beyond the "normal" school day should be stated. This includes, for example, custodial or security services needed to keep the school open after the regular day.

Equipment and materials should be identified as program-related, classroom-related, or student-related. Program-related equipment or material is that which will be used by several students during the day or some time period of the program. Very often the equipment or materials may be grouped by classroom unit. Student-related equipment or material is that which is required because there is a specific number of students in the program. An additional distinction should be made about the consumable nature of the materials and about the lifetime of the equipment. The same treatment should be applied to supplies if the usual district practice is to treat equipment and supplies as separate categories.

The amount of time involved in pre-service and in-service training should be specified. The materials or equipment required should be given. It should be noted if the training time is included as part of the regular time of the staff or if it is incremental to the regular working hours. If in-service training time is a substantial part of the individual teacher's time, additional teachers (or substitute teachers) may be required for the instructional load of the program.

The requirement for program-related services such as evaluation or other management activities should be given. It is preferable if the actual time or the numbers of consultants can be specified. In either case, the purpose is to provide some estimate of the magnitude of these services so that the decision can be made on what it costs to buy the service rather than to develop, if possible, an in-house capability.

Support from other activities means the support required by the educational program from such service functions as transportation. For example, a particular educational program might need bus transportation for field trips. This instructionally-required transportation is over and above the cost of home-to-school transportation.

The resource requirements identified in Fig. 2 are meant to be suggestive only. If other data are available, they should be given, since the purpose is to define as completely as possible those resources and cost-generating activities needed to carry out the educational program.

The resource requirements are then translated into the dollar estimates of program cost--either the comparable replication cost or the incremental cost. A planning cost model provides a framework for systematically and consistently estimating program cost.

### THE PLANNING COST MODEL

The planning cost model provides the mechanism to determine, conveniently and consistently, the cost of various alternative programs. By design, the model is appropriate for pencil-and-paper operation as well as computer operation.\*

The model provides the framework for bringing together the resources (facilities, staff, equipment, materials) required to carry out an educational program and for relating these resources to program output in the form of activities.

By relating the inputs required to produce outputs, in terms of activities, the model provides more information for making decisions about the merit of selected changes in the activity structure of the total program. For example, trade-offs between fewer but longer instructional periods and more but shorter periods could be assessed. The model also provides the basis for examining the cost consequences, for the total program, of changes in the resource utilization rate (i.e., student/teacher ratio) or in resource cost (i.e., teacher salary).

The task of constructing the model demanded a close examination of the concepts of cost analysis, especially in their application to educational program cost methodology. This examination resulted in the delineation of an approach to costing educational programs. Basic to this is the definition of a preliminary list of cost categories. Those costs of school district operation *not* affected by the existence of the

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\* A planning cost model designed for computer operation is described in R-672-SJS, *Project R-3, San Jose, California: Evaluation of Results and Development of a Cost Model*, M. L. Rapp, M. B. Carpenter, S. A. Haggart, S. H. Landa, and G. C. Sumner, The Rand Corporation, March 1971.

program are not included in the estimated cost of the program. An example will serve to clarify this point.

The district cost category, transportation, provides for the transportation of students to and from school. Students in the special program will continue to receive transportation, if they need it, just as though they were not in the special program but were, instead, students in the regular program. This regular transportation cost is not included in the cost of the individual program. But, if the instructional method of the special program calls for field trips or other activities requiring transportation, the cost of this transportation is included as a cost of the special program.

### Cost Categories

The items, services, people, and activities and their cost required for an educational program can be brought together in one format--the cost element structure shown in Fig. 3. These cost elements are grouped into two broad categories: the acquisition cost and the operational cost. The cost of most programs can be adequately encompassed within

<i>Acquisition Cost</i>	<i>Operational Cost</i>
Design of program*	Program direction*
Development of materials*	Evaluation*
Evaluation design*	Management support*
Program implementation	Salaries
Equipment	Teachers
Program-related	Paraprofessionals
Student-related	Specialists
Materials and supplies	Other
Program-related	In-service training
Student-related	Materials and supplies
Pre-service training	Program-related
Facilities (space)	Student-related
Installation	Equipment
	Replacement
	Maintenance
	Facilities O&M
	Contracted services
	Media services
	Transportation

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\* In an operational program, as opposed to a demonstration program, there might be no program cost associated with these activities.

Fig. 3--Cost element structure for educational programs

these two broad categories. The acquisition cost is the one-time cost to acquire a capability. The operational cost is the continuing cost to maintain a capability over a period of time. In the following discussion, one year's operating cost is assumed.

The acquisition, or one-time, cost to acquire a capability is, in practice, also referred to as initial, investment, or capital cost. It covers the cost of all resources required to acquire a capability. The cost of the effort devoted to research, development, or design of components of the program or alternatives should be included as part of this cost. The cost of designing a different mathematics curriculum, for example, is a development cost. In estimating the *comparable replication* cost, however, some overall development costs might be treated as sunk costs. That is, the first program to use the new curriculum would incur this expense, and subsequent programs using the curriculum would inherit the new curriculum on a cost-free basis. On the other hand, if the curriculum had to be redesigned for a particular program, this would be a development cost for that program.

The operational cost is also referred to as the recurring or continuing cost to maintain the capability. The cost of modification of facilities and the cost of in-service training of teachers are included as an operational cost to maintain the program. These broad categories of cost--acquisition and operational--are used as a basis for organizing the cost elements into the cost element structure.

This structure provides the framework for identifying the cost of the program in an operational environment. Each element, whether it is an item purchased or an estimate of activity cost, will be discussed. But first, remember that costs not varying because of the existence of the program are not included. For example, district-wide administrative costs are not allocated.

Costs that might be incurred in a demonstration program but not in an *operational* program are identified by an asterisk in Fig. 3. Some of the cost categories can be characterized as the cost of activities rather than the cost of items purchased. In many instances, the items purchased quite clearly underlie the cost of activities, but the activity cost, however, may be used directly in estimating the program cost. For example, the evaluation cost of a program might be estimated by using a factor such as cost per student. Or, the cost per program might

be used if the evaluation is done by an outside contractor or evaluator. If appropriate, these would be the factors used to estimate the *operational* cost of evaluation. The *acquisition* cost--the non-recurring cost--for evaluation might be based on the district staff time to design the evaluation of the program or might simply be the cost charged by the outside evaluator. The cost basis for these inputs would be per *program* for acquisition cost and per *student* or *program* for the operational cost.

### Cost Basis for Inputs

The cost basis for all inputs for the categories in the cost element structure is shown in Table 1. For each category the cost basis

Table 1  
THE COST BASIS FOR INPUTS

<i>Categories</i>	<i>Cost Basis</i>			
	<i>Student</i>	<i>Program</i>	<i>Unit</i>	<i>Service</i>
<b>Acquisition Cost</b>				
Design of program		x		
Development of materials		x		
Evaluation design		x		
Program implementation		x		
Equipment				
Program-related		x	x	
Student-related	x			
Materials				
Program-related		x	x	
Student-related	x			
Pre-service training		x		x
Facilities	x			
Installation			x	
<b>Operational Cost</b>				
Program direction		x		
Evaluation	x	x		
Management support		x		
Salaries				
Teachers	x			
Paraprofessionals	x			
Specialists	x	x		
Other	x	x		
In-service training		x		x
Materials and supplies				
Program-related		x	x	
Student-related	x			
Equipment				
Replacement			x	
Maintenance			x	
Facilities O&M				x
Contracted services	x			x
Media services	x			x
Transportation	x			x

is either per student, per program, per unit, or direct service charge. The per student and per program distinction is rather obvious; the per unit basis refers to units such as classrooms, resource centers, and language laboratories. The service basis is used when the input to the model might be the extent of a service performed either within the district or by an outside source. An example of the former would be the operation and maintenance of the facilities; the latter service-based input might cover such items as the contracted transportation for the instructional part of a program or the provision of so many hours of instructional television.

In some cases, the cost input basis might be a combination of program and unit (classroom), of student and service, or of program and service. No rigidity is implied. The intent is to provide an understanding of how the inputs of the model are categorized. This categorization is basic to the structure of the planning cost model. At this time, it is only necessary to emphasize that some level of input is required because there is a certain number of students, and other levels of input are required because there is a certain number of classrooms or instructional centers. In many cases, there is a *program* cost that is independent of the number of students or centers.

#### Outputs and Inputs of the Model

A program-related cost can be a thruput to the model. For example, the cost of program development would be both an input and output. The cost of pre-service training for the teachers in the program is calculated within the model. The physical descriptors of the program and cost factors, such as the number of teachers, the salary cost, the cost per mile, are the inputs to the model. The objective is to keep the number of inputs to a workable minimum while allowing enough input flexibility to provide useful outputs of the model for the evaluation and planning of educational programs.

The outputs of the model are, in general, the resource and cost information about the specific educational program. The *descriptors of the program*--number of teachers; number of students; space requirements; equipment, materials, and supplies; and need for services such as transportation or evaluation--are shown right along with the cost.

output. The purpose is to provide, in one place, an estimate of the comparable replication cost and a description of what is being bought. As this practice becomes more prevalent, the use of a cost per student to describe an unknown quantity will decrease and the quality of information available to the educational planner will increase.

The output of the model is illustrated in Figs. 4 and 5. Notice the similarity of the format to the cost element structure of Fig. 3. More detailed information for any of the items shown can be provided in supporting reports. For example, the resources and cost underlying the cost per student hour under Media Services might be of interest for some types of decisions. The supporting detail for this would follow the same cost element structure used for estimating the cost of the entire educational program.

#### Description of Program

Program:	Objective:
Staffing:	Student Characteristics:
Facilities:	
Equipment:	Operational Characteristics:
	Instructional time
Materials:	Student grouping
	Location

#### Acquisition Cost

Program activities	\$	xxx
Equipment		xx
Facilities		xx
Materials		xx
Total acquisition cost . . . . .	\$	xxxx

#### Operational Cost

Program activities	\$	xxx
Salaries		xxxx
Materials		xx
Supplies		xx
Equipment		xx
Other support		xx
Total operational cost . . . . .	:	\$xxxxx

Fig. 4--Summary output of the model

Acquisition Cost

Program Activities:	Design of Program	\$ xxx	
	Development of Materials	xxx	
	Evaluation Design	xxx	
	Program Implementation	xxxx	
	Pre-service Training	xxx	
	Installation	xxx	\$xxxxx
Equipment:	Program-related	\$ xxx	
	Student-related	xxx	xxxx
Facilities:	Student-related	\$ xxx	xxx
Materials:	Program-related	\$ xx	
	Student-related	xx	xxx
	Total Acquisition Cost		\$xxxxx

Operational Cost

Program Activities:	Program Direction	\$ xxx	
	Evaluation	xxx	
	Management Support	xx	
	In-service Training	xx	
	Facilities O&M	xx	
	Contracted Services	xx	
	Media Services	xx	
	Transportation	xx	\$ xxxx
Salaries:	Teachers	xxxx	
	Specialists	xxx	
	Paraprofessionals	xxx	
	Other	xxx	xxxx
Materials:	Program	xx	
	Student	xx	xxx
Supplies:	Program	xx	
	Student	xx	xx
Equipment:	Replacement	xx	
	Maintenance	xx	xx
Other support:			xx
	Total Operational Cost		\$xxxxx

Fig. 5--Detailed output of program cost estimate



The inputs of the model fall into three broad groups: (1) the physical descriptors of the program; (2) the cost of resources and services; and (3) the factors or estimating relationships. The physical descriptors, including the type and quantity of resources, were shown in Fig. 2, *Format for Program and Resource Information*. In short, these inputs describe the students, the educational program, and the resource requirements. Inputs are required for all the changes, or variables, that make one program different from another program.

The inputs describe the cost of resources and services and cover such items as the cost of equipment used, the salaries of the staff, the cost of testing, the cost of transportation, and the cost of training. The input factors, or estimating relationships, include both cost factors such as cost of materials per student and non-cost estimating relationships such as number of in-service training days per teacher.

#### The Structure of the Model

The model integrates the program description, in terms of resources required, with the process of estimating the program cost. This process begins with the determination of resource requirements and continues with the translation of these resource requirements into an estimate of dollar cost. Both the acquisition cost and the operational cost are estimated.

The model's framework for estimating the acquisition and the operational cost is shown in Figs. 6 and 7, respectively. For each cost category there is an estimate of cost on either a student, program, unit, or service basis. In the case of "units," the estimate can be the cost per teacher, the cost of the equipment per classroom or instructional center, or the cost per student or materials consumed. For some cost categories, the estimate can be based on an overall program cost. For example, the pre-service training, if done by an outside contractor, might be a total cost for the program. It could also be a cost per teacher.

In the cost category for Materials, the cost estimate may require an estimate for the cost for student-related materials, for the cost of materials in the classroom for use by many students, and for the cost of program materials used by the staff in conducting the program. The same practice is followed for the cost categories of the framework for the operational cost in Fig. 7.

<i>Cost Category</i>	<i>Student</i>	<i>Program</i>	<i>Unit</i>	<i>Services</i>
Design of Program		\$/Program		
Development of Materials		\$/Program		
Evaluation Design		\$/Program		\$/Service
Program Implementation		\$/Program		
Pre-service Training		\$/Program	\$/Teacher	\$/Service
Installation		\$/Program	\$/Equipment	
Equipment	\$/Student	\$/Program	\$/Classroom	
			\$/Resource Center	
Facilities	\$/Student		\$/Resource Center	
Materials	\$/Student	S/Program	S/Classroom	
Other Support	\$/Student	\$/Program	S/Classroom	\$/Service

Fig. 6--The planning cost model--acquisition cost

<i>Cost Category</i>	<i>Student</i>	<i>Program</i>	<i>Unit</i>	<i>Services</i>
Program Direction		\$/Program		
Evaluation		\$/Program		\$/Service
Management Support		\$/Program		\$/Service
Facilities O&M			\$/Space	
Contracted Services				\$/Service
Media Services				\$/Service
Transportation	\$/Student	\$/Program		
Salaries (including fringe benefits)				
Teachers			\$/Teacher	
Specialists			\$/Specialist	
Paraprofessionals			\$/Aide	
Other			\$/Type	
Materials				
Program-related	\$/Student	\$/Program		
Student-related	\$/Student			
Supplies				
Program-related	\$/Student	\$/Program		
Student-related				
Equipment				
Replacement			\$/Unit	
Maintenance			\$/Unit	
Other Support	\$/Student	\$/Program	\$/Unit	\$/Service

Fig. 7--The planning cost model--operational cost

The cost categories provide a convenient way to identify the data needed about the educational program and its operation in order to estimate its cost. The data for the cost categories for both the acquisition and operational cost are shown separately in Figs. 8 and 9, respectively.

#### USE OF THE PLANNING COST MODEL

##### Estimating the Comparable Replication Cost

The use of the model will be illustrated by estimating the comparable replication cost for several different programs. It should be emphasized that in order to compare programs in different districts, comparable resources prices and salaries have to be used. A comparison of actual costs would have little meaning since the differences among programs would not only reflect differences in the programs but also differences in teacher salaries and other local prices.

As shown in Fig. 1, the process of estimating the comparable replication cost and the incremental cost for a program begins with a description of the program and its resource requirements. This information is then processed through the model in order to estimate the cost. The description of the program includes both program information and resource information as shown in the format of Fig. 2.

The program and resource data for several illustrative programs are given in detail in the appendix. The summary of this information is given in Table 2. The resource requirements are estimates of what it would take to replicate the instructional strategy of the program.

The information under Other Support provides an example. In the replicated program, there is an item for consultants to the program. It is estimated as approximately eight days for the year of program operation. This is an estimate of what might be needed in a future program rather than an estimate of what was used in past programs. The same is true for Program Evaluation. A category for this type of activity calls attention to the need for evaluation of the program even in operation as part of the regular district programs. In the estimate for the replication cost, this category incurs a cost per student for evaluation of the program.

<i>Cost Category</i>	<i>Data Requirements</i>
Design of Program Development of Material Evaluation Design Program Implementation Pre-service Training Installation	o If these activities are required for the program, the <i>number</i> , the <i>type</i> of personnel involved, the <i>time</i> spent, and salary are needed.
Equipment	o The equipment list is determined for each student, for each classroom, and, if applicable, for the program. The classroom's equipment is used by several classes of students. The number of students that can use the equipment is specified.
Facilities	o The space required is that over and above the regular program; both for each student or for special resource centers.
Materials	o The initial stock of materials is determined for each student, for each classroom, and, if applicable, for the program.

*Fig. 8--Program data--acquisition cost categories*

<i>Cost Category</i>	<i>Data Requirements</i>
Program Direction Evaluation Management Support	o The number and type of staff, the time spent for each activity, and salary are needed for this.
Salaries (with fringe benefits)	o All instructional staff and direct support classes of staff are identified by broad category; i.e., general teachers, specialists, and aides rather than a teacher with a specific salary are used. Fringe benefits are included at the district percentage factor.
Materials and Supplies	o The type and quantity of materials used are specified on a student and program basis.
Equipment	o The equipment maintenance factor and the equipment replacement factor (based on the estimated lifetime of the equipment) are applied to the equipment used in the program.
Facilities O&M Contracted Services Media Services Transportation	o The program requirements for each of the categories are specified in terms of square feet maintained, services purchased, number of hours of audio-visual instruction and bus trip mileage.

*Fig. 9--Program data--operational cost categories*

Table 2  
PROGRAM RESOURCE REQUIREMENTS

Item	Program A	Program B	Program C	Program D	Program E	Program F
Number of Students: Reading	350	285	491	150	103	250
Math	350	285	535	150	103	---
Instructional Time: Reading	1	1	1	1.25 <sup>a</sup>	1.25	1
(in hours) Math	1	1	1	1.25	1.25	---
Facilities						
Space	4 trailers 2 classrooms 900/1000	4 trailers 1 classroom 1600/1000	2 sgl centers <sup>b</sup> 1 dbl center <sup>b</sup> 1 reinforcement	1 classroom 1 activity area	1 classroom 1 activity area	2 classrooms ---
Total square feet	5600	4600	8000	2000	2000	2000
Air conditioned	x	x	x	x	---	x
Carpeted	x	x	x	x	x	x
Special wiring	x	x	x	x	x	x
Carrels	x	x	x	x	x	---
Tables	x	x	x	x	x	x
Utilization						
Time in use	3(2-hr)shifts	3(2-hr)shifts	7 periods	5 <sup>a</sup>	5	5
Student/instructional unit	20	20	40-S; 65-D	50	50	25
Area/student (sq ft)	50	50	50	40	40	40
Staffing						
Teachers/center or unit	1	1	1	1	1	1
Paraprofessionals/unit	1	1	1	2	3	1
Students per teacher	20	20	40/60	50	50	25
Teachers per program	6	5	4	1	1	2
Paraprofessionals/program	6	5	5	2	3	2
Other direct	---	---	---	---	---	---
Equipment						
Major items	Dorsett M-86 Teaching machine	EDL AUD-X Controlled readers Tach-X Flash-X	Hoffman readers Tape recorders Flashcard rdrs Borg-Warner 80 (backup)	Telex Cassette recorders Tape recorders	Telex Cassette recorders Tape recorders Language master	Cassette players Tape recorders
Materials						
Program-related	Filmstrips Records Dorsett materials	Filmstrips Discs EDL materials	Hoffman mats EDL materials Great variety Borg-Warner mats	BRL materials Cassettes Variety of other	BRL materials Cassettes Variety of other	Filmstrips Cassettes Paperbacks
Consumables (student-related)	x	x	x	x	x	x
Pre-service training						
Teachers	2 weeks	1 week	2 weeks	1 week	1 week	1 week
Paraprofessionals	2 weeks	1 week	---	1 week	1 week	---
Other staff	---	---	---	1 week	---	---
In-service training	5 days	---	2 hr/wk	4 days	3 days	3 days
Other Support						
Student diagnostic services	---	---	---	x <sup>c</sup>	x <sup>c</sup>	---
Program evaluation	x	x	x	x	x	x
Consultants	8 days	8 days	8 days	8 days	8 days	8 days

<sup>a</sup>Two 75-minute periods for grades 1-4 with reinforcement in regular classes. One 2.25-hr period grades 5 and 6.

<sup>b</sup>Each center has an instructional area plus an activity area.

<sup>c</sup>A remote diagnostic and prescriptive services.

The dollar cost information for these illustrative programs is shown shown in Table 3. These are for the estimates of the comparable replication cost. This information is combined with the program and resource information of Table 2 and provides the basic input information for the planning cost model.

The standard input costs and the factors for use in the planning cost model are given in Fig. 10. The term "standard" is used as a description of the factor used across all programs.

A cost of \$12,000 per year per teacher is used in the model to estimate the comparable replication cost. This includes the fringe benefits (fixed charges in most district accounting systems). This is obviously out of line for, say, a small rural district in the southeastern part of the country. But because this factor was used for all the programs, the different cost for the salary expense of the program cost actually *reflects the difference in the number of teachers needed* for the program. This same argument applies to all the standard resource costs and factors used in the planning cost model.

The comparable replication cost for each of the illustrative programs is given in Table 4. The acquisition cost includes the cost to remodel and furnish the instructional centers, the cost of the equipment and the materials needed for all the instructional centers, and the pre-service training cost of the program staff. The operational cost includes the salaries of the staff, the cost of materials consumed or lost through attrition or theft, the cost of replacing and maintaining the equipment, the cost of in-service training, and other support, which includes a program evaluation cost on a per-student basis per year and consultants required during the year. The comparable replication cost along with the relevant dimensions of the specific programs is summarized in Table 5.

The estimation of the comparable replication cost has an advantage in addition to adjusting for variations in the resource prices so that the cost of programs in different districts is on a comparable basis. This advantage lies in the discipline necessary to organize the program information and the cost information. In Table 5, the operational cost per student per subject offers a quick comparison of the relative merits of the programs. The other data of Table 5 can be analyzed in a similar fashion. Care must be taken, however, not to develop misleading "results."

Table 3  
PROGRAM COST INFORMATION  
(Costs in dollars)

	Program A	Program B	Program C	Program D	Program E	Program F
<b>Equipment Cost</b>						
Total	20,400	15,000	37,000	2,500	2,000	5,000
Cost per instructional area	3,400	3,000	9,250 <sup>a</sup>	2,500	2,000	2,500
Number of instructional areas	6	5	4	1 <sup>b</sup>	1 <sup>b</sup>	2
Students per instructional area	20	20	40/65 <sup>c</sup>	50	50	25
Replacement--10 percent	2,040	1,500	3,700	250	200	500
Maintenance--10/20 percent	4,080	3,000	7,800	250	200	500
<b>Materials Cost</b>						
Total	18,000	20,000	45,000	8,000	8,600	7,600
Cost per instructional area	3,000	4,000	11,250 <sup>a</sup>	8,000	8,600	3,800
Number of instructional areas	6	5	4	2	2	2
Consumables (\$ per student)	10	10	10	10	10	5
<b>Pre-service Training</b>						
Number of staff days <sup>d</sup>	120	50	90	15	20	20
Cost per day <sup>e</sup>	200	200	200	200	200	200
Total cost	24,000	10,000	18,000	3,000	4,000	4,000
<b>In-service Training</b>						
Number of staff-days	30	--	32	12	12	12
Cost per day	200	--	200	200	200	200
Total cost	6,000	--	6,400	2,400	2,400	2,400
<b>Other Support</b>						
Student diagnostic services	--	--	--	50 <sup>f</sup>	50 <sup>f</sup>	--
Student evaluation (\$/student)	10	10	10	10	10	10
Consultants (\$100/day)	800	800	800	800	800	800

<sup>a</sup>Cost per center includes reinforcement areas. Single center cost slightly more than cost shown.

<sup>b</sup>One classroom area plus one activity area.

<sup>c</sup>Forty students per single center, sixty-five per double.

<sup>d</sup>Includes time for paraprofessional training.

<sup>e</sup>Includes salary, materials, and training costs.

<sup>f</sup>Remote diagnostic and prescriptive services.



Facilities

Remodeling (including carpeting, airconditioning, etc.) .....	\$ 3,000/center
Furnishings (including carrels) .....	\$ 2,000/center

Equipment

Replacement .....	10%
Maintenance (depends on estimate of reliability based on complexity) .....	10% or 20%

Materials

Attrition from use, theft .....	10%
Consumables .....	\$10/student

Salaries (including fringe benefits)

Teachers .....	\$12,000/year
Paraprofessionals .....	\$ 5,000/year
Specialists .....	\$12,000/year
Program directors .....	\$15,000/year
General support .....	\$10,000/year
General administrative .....	\$12,000/year
Consultants .....	\$100/day

Pre- and In-service Training (including  
salaries, materials, training) .....

\$200/day

Program Evaluation .....

\$10/student

*Fig. 10--Standard resource costs and factors*

Table 4  
COMPARABLE REPLICATION COST FOR THE ILLUSTRATIVE PROGRAMS  
(In dollars)

<i>Acquisition Cost</i>	<i>Program A</i>	<i>Program B</i>	<i>Program C</i>	<i>Program D</i>	<i>Program E</i>	<i>Program F</i>
Facilities (remodel, furnish)						
Total program cost	30,000	25,000	20,000	7,500	7,500	10,000
(Cost/instructional area)	(5,000)	(5,000)	(5,000)	(3,750)	(3,750)	(5,000)
Equipment						
Total program cost	20,400	15,000	37,000	2,500	2,000	5,000
(Cost/instructional area)	(3,400)	(3,000)	(9,250)	(2,500)	(2,000)	(2,500)
Materials						
Total program cost	18,000	20,000	45,000	8,000	8,600	7,600
(Cost per instructional area)	(3,000)	(4,600)	(11,250)	(8,000)	(8,600)	(3,800)
Pre-service Training	24,000	10,000	18,000	3,000	4,000	4,000
Total acquisition cost	92,400	70,000	120,000	21,000	22,100	26,600
<i>Operational Cost</i>						
Salaries (incl fringe benefits)						
Teachers (\$12,000/yr)	72,000	60,000	48,000	12,000	12,000	24,000
Paraprofessionals (\$5,000/yr)	30,000	25,000	25,000	10,000	15,000	10,000
Other (variable)	--	--	--	--	--	--
Materials						
Program-related (10%)	1,800	2,000	4,500	800	860	760
Consumables (student)	3,500	2,850	5,000	1,500	1,030	2,500
Equipment						
Replacement	2,040	1,500	3,700	250	200	500
Maintenance	4,080	3,000	7,800	250	200	500
In-service Training	6,000	--	6,400	2,400	2,400	2,400
Other Support						
Student diagnostic services	--	--	--	7,500 <sup>a</sup>	5,000 <sup>a</sup>	--
Student evaluation (testing)	3,500	2,850	5,000	1,500	1,000	2,500
Consultants (\$100/day)	800	800	800	800	800	800
Total operational cost	123,720	98,000	106,200	37,000	38,490	47,960

<sup>a</sup> Remote diagnostic and prescriptive services.

Table 5  
COMPARABLE REPLICATION COST  
(Costs in dollars)

Item	Program A	Program B	Program C	Program D	Program E	Program F
Number of students	350	285	515	150	103	250
Number of students/instr center <sup>a</sup>	20	20	40/65 <sup>b</sup>	50	50	25
Acquisition cost	92,000	70,000	120,000	21,000	22,000	26,600
Number of instructional centers	6	5	4 <sup>c</sup>	1 <sup>d</sup>	1 <sup>d</sup>	2
Operational cost	124,000	98,000	106,000	37,000	38,500	44,000
Operational cost/student	354	344	206	247	373	176
Operational cost/student/subject <sup>e</sup>	177	172	103	124	187	176

<sup>a</sup>Instructional center = the basic provisional unit for acquisition cost.

<sup>b</sup>Forty students per single center; 65 students per double center.

<sup>c</sup>In addition to the center, there is one reenforcement area.

<sup>d</sup>The instructional center is augmented by an activity area of equivalent size.

<sup>e</sup>Reading and mathematics for all programs except Program E.

For example, the acquisition cost per student could be obtained, it seems, simply by dividing the acquisition cost by the number of students. The problem lies in just what "number" of students to use. If the total number of students in all the instructional periods (or some such time division) is used, the acquisition cost per student reflects an implicit utilization rate for the instructional center. A case in point is Program C. In that program, the instructional centers are used seven periods (or hours) each day. In current practice, that is the maximum utilization rate for facilities in any one day. In Program A, on the other hand, if the instructional centers had been used for seven periods instead of six, one less instructional center would have had to be furnished.

If the number of students per instructional center is assumed as "best," then the acquisition cost on a per-student basis for each instructional center for each program can be obtained and qualified by a statement of the utilization rate of the instructional centers. An obstacle is encountered in using the acquisition cost per student per program. That is, that the equipment and materials purchased for one year will have more than one year's service as the program is continued. In short, the use of the acquisition cost per student as an indicator of program cost is fraught with hazards. These hazards are explored in the section on estimating the incremental cost of a specific program in a particular district.

#### Estimating the Incremental Cost

The comparable replication cost serves as an "index" cost for use in the comparative analysis of different programs. It does not answer the question of what a new program might cost if implemented in a specific school district. The incremental cost to the district is necessary in making decisions about whether or not the district can afford a program similar to the successful program in another district. This cost is necessary when deciding the scope and the design of the program that can be accommodated within the resource constraints of the district.

The process of estimating the incremental cost is essentially the same as the process of estimating the comparable replication cost. The

emphasis is on estimating the resource requirements and on translating these requirements into an estimate of cost. In some districts, the unavailability of certain resources might be an obstacle to the implementation of a program even though the district had the funds to afford the program in an accounting sense. This possibility makes it all the more important to estimate the physical resources needed to implement and operate a program.

In estimating the incremental resource requirements, the resources available within the district at no additional cost are taken into account. These resources could be, for example, assets inherited from discontinued programs, physical resources provided cost-free by the community, or volunteer services. After the net incremental resource requirements are determined, district-specific resource prices and cost factors are used to develop the estimated incremental program cost, using the methodology of the planning cost model. Specifically, the standard resource costs and factors shown in Fig. 10 are changed to district-specific costs.

To illustrate the process and considerations in estimating the incremental cost of a program, the data for Program E (shown in estimating the comparable replication cost) will be used. These data are shown in Tables 6, 7, and 8.

Data about Program E could have been generated by either the district of original implementation or by a state or federal agency in their evaluation of programs funded through the agency. Whatever the source, program data of this nature is essential information to another district in its assessment of potentially effective "new" programs.

In this illustration, it is assumed that information about all the programs, A through F, was available and that Program E was tentatively selected as the most-likely-to-succeed program. Preliminary examination of the data used to develop the comparable replication cost (CRC) for Program E leads the district planners to believe that the incremental cost to its district will be significantly lower. The district's current salary schedule sets average teacher salary at \$9000 and paraprofessionals at \$4000. A major portion of the equipment and materials required for the program are available within the district.

Table 6

PROGRAM AND RESOURCE INFORMATION FOR PROGRAM E  
An Elementary Level, Reading and Mathematics Program

<i>Descriptors</i>	<i>Resource Information</i>
Students Served	Grades 2-4 Title I; low SES Underachievers
Instruction	
Class time	1.25 hours - Reading 1.25 hours - Mathematics
Number of students	103
Students/instructional area	50±
Number of sections	2
Utilization	5 hours/day
Facilities	
Space	2000 square feet 1 instructional area 1 activity area
Furnishings <sup>a</sup>	6 carrels Carpeting Tables and chairs
Staffing	
Certified teachers	1 per instructional area
Special teachers	None
Paraprofessionals	2 per instructional area 1 per activity area
Equipment <sup>a</sup>	Telex (remote diagnostic) Tape recorders Cassette players Headsets
Materials <sup>a</sup>	Books, games, incentives
Pre-service Training	5 days - formal
In-service Training	3 days - formal
Other support	Remote diagnostic-Prescrip- tive services

<sup>a</sup>Quantity and quality of items would be specified in supporting lists.

Table 7  
COST INFORMATION FOR PROGRAM E  
(Costs in dollars)

<i>Item</i>	<i>Cost</i>
Facilities Cost	
Total program cost	7,500 <sup>a</sup>
Cost per instructional area <sup>a</sup>	5,000
Equipment Cost	
Total	2,000
Cost per instructional area <sup>a</sup>	2,000
Number of instructional areas	1 <sup>a</sup>
Students per instructional area	50
Replacement factor 10%	200
Maintenance factor 10%	200
Materials Cost	
Total	8,600
Cost per instructional area	8,600
Number of instructional areas	1 <sup>a</sup>
Consumables (\$ per student)	10
Pre-service Training	
Number of staff days <sup>b</sup>	20
Cost per day <sup>c</sup>	200
Total cost	4,000
In-service Training	
Number of staff days	12
Cost per day	200
Total cost	2,400
Other support	
Student diagnostic service	50 <sup>d</sup>
Program evaluation (\$ per student)	10
Consultants (\$100 per day)	800

<sup>a</sup>One instructional plus one activity area.

<sup>b</sup>Includes time for paraprofessional staff.

<sup>c</sup>Includes salary, materials, and training costs.

<sup>d</sup>Contracted diagnostic and prescriptive services.

Table 8  
COMPARABLE REPLICATION COST FOR PROGRAM E  
(In dollars)

<i>Item</i>	<i>Cost</i>
<u>Acquisition Cost</u>	
Facilities (remodel/furnish)	
Total program cost	7,500
(Cost per instructional area)	(3,750)
Equipment	
Total program cost	2,000
(Cost per instructional area)	(2,000)
Materials	
Total program cost	8,600
(Cost per instructional area)	(8,600)
Pre-service training	4,000
Total acquisition cost	<u>22,100</u>
<u>Operational Cost</u>	
Salaries (including fringe benefits)	
Teachers (\$12,000/year)	12,000
Paraprofessionals (\$5,000/year)	15,000
Other (variable)	--
Materials	
Program-related (10%)	860
Consumables (student-related)	1,030
Equipment	
Replacement (10%)	200
Maintenance (10%)	200
In-service training	2,400
Other support	
Student diagnostic services <sup>a</sup>	5,000
Program evaluation	1,000
Consultants	800
Total operational cost	<u>38,490</u>

<sup>a</sup>Diagnostic and prescriptive services by contracted services.



For this district, the CRC for Program E represents a maximum expected program cost. For another district, with a higher salary schedule and no equipment or materials on hand, the CRC for Program E would be lower than its incremental cost. Both districts gain needed insights about the cost impact of Program E from just a quick look at the CRC for Program E. These insights cannot be developed if the only cost information the district has about Program E is a cost per student or the total program cost specific to the district originally developing the program.

In developing the program cost estimates for use in designing the scope and nature of Program E, the district determines the resources available within its inventory and matches this information with the resources required to implement and operate the program. The resulting incremental resource requirements are translated by means of the planning cost model into an estimate of incremental cost. In this translation process, district-specific resource prices and factors are used.

The data needed and the results of the incremental cost analysis for the various configurations of Program E are presented in the same formats as Tables 6, 7, and 8. As an illustration, the incremental cost for two program configurations (160 students and 200 students) is shown in Table 9. The assumptions, incremental resource requirements and district-specific resource prices supporting the cost estimates would be displayed, *in practice*, in the formats of Tables 6 and 7. In this illustration, most of the information can be identified in Table 9. Just briefly, the district has in inventory about 50 percent of the required equipment for a program of 100 students. Adequately remodeled space is available for one instructional area and one activity area. But, two instructional areas and activity areas are needed for 160 students. Only carrels have to be purchased in order to furnish as many as four centers. For one configuration, the district looks at the cost impact of developing an in-house capability for the diagnostic-prescriptive services that are provided to the other configurations on a contracted basis. This leads to an increase in the cost of pre-service training and the additional operational cost for staff members to provide this program-related service.

Table 9

INCREMENTAL COST ESTIMATES FOR ALTERNATIVE CONFIGURATIONS OF PROGRAM E  
(In dollars)

<i>Program Cost Category</i>	<i><u>E<sub>1</sub></u> 160 students</i>	<i><u>E<sub>2</sub></u> 200 students</i>	<i><u>E<sub>3</sub></u> 160 students</i>
<b>Acquisition Cost</b>			
Facilities (Remodel/furnish) (1 instructional and 1 activity area have to be remodeled)	3,500	3,500	3,500
Equipment (Unit cost/instructional area for 40 students is \$2,000)	3,000	3,800	3,000
Materials (Unit cost for instructional area for 40 students is \$6,500)	13,900	17,200	13,000
Pre-service Training (5 days per staff member and training of forty days for diag- nostic services in E <sub>3</sub> )	<u>4,000</u>	<u>8,000</u>	<u>12,000</u>
Total Acquisition Cost	23,500	32,500	31,500
<b>Operational Cost</b>			
Salaries			
Teachers (\$9,000)	(2) 18,000	(2) 18,000	(2) 18,000
Paraprofessionals (\$4,000)	(2) 8,000	(6) 24,000	(2) 8,000
Other (\$5,000/1/3 time)	---	---	---
Materials			
Program-related	1,300	1,720	1,300
Consumables	1,600	2,000	1,600
Equipment			
Replacement	400	500	400
Maintenance	400	500	400
In-service Training	3,200	6,400	3,200
Other support			
Student diagnostic services	8,000	10,000	---
Program evaluation	1,600	2,000	3,200
Consultants	<u>800</u>	<u>800</u>	<u>800</u>
Total Operational Cost	43,300	65,920	41,900

The resulting program cost analysis provides the information needed by the district in making the decision about whether to plan the implementation of the program and, if so, what configuration of program can be afforded within the resource constraints of the district. As a final note, two points should be made clear. First, these cost estimates are *planning* cost estimates. Much greater detail and accuracy are required to meet the needs of actual implementation and financial accountability. Second, analysis of the dollar-cost alone does not provide adequate information for educational decisions; for this reason the emphasis here is on the analysis of both the dollar and non-dollar resources required for alternative programs.

## Appendix

### DETAILS OF PROGRAM AND RESOURCE INFORMATION

Table 10

PROGRAM AND RESOURCE INFORMATION

Program A

<i>Descriptors</i>	<i>Information</i>
Characteristics of Students Served	Grades 7-12 Educationally disadvantaged (at least 2 years below level)
Number of Students	350 { Reading Math
Instructional	
Class time	{ 1 period Math 1 period Reading
Class size	20 students per classroom area
Facilities	
Space	4 trailers @ 900 sq ft
Students/classroom/day	2 classrooms @ 1000 sq ft
Utilization	6 hr/day; three 2-hr shifts
Furnishings	Desks, carrels, carpet, air conditioning
Staffing	
Teachers	6
Special teachers	0
Paraprofessionals	6
Other personnel	Project manager; associate manager
Equipment	Dorsett M-86 Teaching Machines
Materials	Filmstrips, records
Pre-service Training	1 week per teacher
In-service Training	5 days total
Other Support	
Incentives	

Table 11

PROGRAM AND RESOURCE INFORMATION

Program B

<i>Descriptor</i>	<i>Information</i>
Characteristics of Students Served	7-12 grades Educationally handicapped (at least 2 years below grade level)
Number of Students	285 { Reading Math
Instruction	{ 1 period Math 1 period Reading 20 students per classroom area
Facilities	
Space	4 trailers @ 900 sq ft 1 classroom @ 1000 sq ft
Number of students	20 per classroom area
Utilization	6 hr/day; three 2-hr shifts
Furnishings	Desks, carrels, carpeting, air conditioning
Staffing	
Teachers	5
Specialists	0
Paraprofessionals	5
Other staff	Project manager; associate manager
Equipment	EDL, AUD-X, Tach-X, controlled readers, Flash-X
Materials	Filmstrips, discs
Pre-service Training	40 hr per teacher and aide
In-service Training	No formal training
Other Support	None

Table 12  
PROGRAM AND RESOURCE INFORMATION

Program C

Descriptors	Information												
Characteristics of Students	Grades 6-9 Transient $\frac{1280}{1100}$ yearly turnover Black, model cities neighborhood Low income Lowest achievers according to last spring's testing Specialized pupils included Program pupils distributed among all homerooms												
Instructional													
Number of students (as of mid-December)	491 (Reading); 535 (Math) (same students)												
Class time	45 minutes/day (Reading and Math each)												
Class size	35-40 in single center (SC) (40 optimum); 60-65 in double center (DC) (optimum)												
Number of sections	14 each (7-period day)												
Facilities													
Space	4 centers: 1 DC for reading and math; 1 SC for reading and 1 SC for math; each center has an instructional and an AMS area 1 reinforcement room total occupies space of 7 former classrooms (walls were changed)												
Students/classroom/day	$\frac{\text{No. students per day} = (491 + 535)}{\text{No. classrooms} = 7} = 147$												
Furnishings	Table space for carrels Carpeting Air conditioning 1 carrel per student per class (i.e., approximately 140 total) Chairs												
Staffing													
Certified teachers	1 per center (Reading and Math each)												
Special teachers	None												
Paraprofessionals	Full-time: 1/center; 1 for reinforcement room												
Other personnel	1 Substitute 1 full-time director 1 full-time secretary												
Equipment													
Primary unit	40 Hoffman Reading machines												
Supplementary system	25 tape recorders/center (50 total)												
Redundant system	15 Borg-Warner System 80												
Materials (10% consumable)	<table> <tr> <th>Reading</th><th>Math</th></tr> <tr> <td>2 sets EPL tapes/center</td><td>40 tape recorders/center (80 total)</td></tr> <tr> <td>2 sets Hoffman materials (levels B to G)/center</td><td>40 flashcard readers (Electronic Futures, mfg.)</td></tr> <tr> <td>Workbooks (not on per pupil basis)</td><td>Math mini system (tapes)</td></tr> <tr> <td>2 sets Borg-Warner materials (levels 1-8) per reading and math center (i.e., of complete sets)</td><td>Workbooks (not on per pupil basis)</td></tr> <tr> <td>1 notebook per student for compiling materials</td><td></td></tr> </table>	Reading	Math	2 sets EPL tapes/center	40 tape recorders/center (80 total)	2 sets Hoffman materials (levels B to G)/center	40 flashcard readers (Electronic Futures, mfg.)	Workbooks (not on per pupil basis)	Math mini system (tapes)	2 sets Borg-Warner materials (levels 1-8) per reading and math center (i.e., of complete sets)	Workbooks (not on per pupil basis)	1 notebook per student for compiling materials	
Reading	Math												
2 sets EPL tapes/center	40 tape recorders/center (80 total)												
2 sets Hoffman materials (levels B to G)/center	40 flashcard readers (Electronic Futures, mfg.)												
Workbooks (not on per pupil basis)	Math mini system (tapes)												
2 sets Borg-Warner materials (levels 1-8) per reading and math center (i.e., of complete sets)	Workbooks (not on per pupil basis)												
1 notebook per student for compiling materials													
Pre-service training	One week on AMS in-depth training One week going through materials												
In-service training	About 2 hr/week												
Other Support	None, instructional program self-contained												

Table 13

PROGRAM AND RESOURCE INFORMATION

Program D

<i>Descriptors</i>	<i>Information</i>
Characteristics of Students	{ Grades 1-6 Inner-city, black, low income Transiency = 30% Lowest achievers for first 5 months, then entire school (excluding most special education students)           }
Program Scope	
Instruction	Reading and math
Number of students	Initially 100, later 150 (as of February)
Class time	Initially 2-1/4 hr, later reduced to 75 minutes for grades 1-4
Class size	45-55 (maximum at 60)
Number of sections	Three (one each for grades 1 and 4, 2 and 3, and 5 and 6)
Facilities	
Space	Two regular classrooms
Students/classroom/day	75
Furnishings	{ 30 carrels and chairs, with electric out- lets at each carrel 7 tables, 21 chairs 3 bookshelf-cabinets Carpeting           }
Staffing	
Certified teachers	One (no outside preparation required)
Special teachers	None
Paraprofessionals	Two, 6-hr day
Other personnel	On-site director and secretary
Equipment	
Telex	1
Cassette tape records	30
Materials	BRL modern math texts Large variety of other materials
Pre-service Training	Five days for entire staff of school
In-service Training	Eight morning meetings for entire staff
Other Support	None



Table 14

PROGRAM AND RESOURCE INFORMATION

Program E

<i>Descriptors</i>	<i>Information</i>
Characteristics of Students Served	Grades 2-4; Title I Low SES
Instruction	
Class time	1.25 Reading 1.25 Math
Number of students	103
Class size	50 students per class
Number of sections	2
Utilization	5 hr. per day
Facilities	
Space	{ 2000 sq ft 1 classroom 1 activity area
Furnishings	{ 6 carrels Carpeting Tables
Staffing	
Certified teachers	1 per center
Special teachers	none
Paraprofessionals	{ 2 per center 1 per activity area
Other personnel	
Equipment	{ Telex Tape recorders Cassette players Headset
Materials	Books, games, toys
Pre-service Training	5 days
In-service Training	4 days, total
Other Support	Remote diagnostic and prescriptive
Incentives	25 per student--candy, scrip

Table 15

PROGRAM AND RESOURCE INFORMATION

Program F

<i>Descriptors</i>	<i>Information</i>
Characteristics of Students Served	Title I students
Number of Students	250
Instructional	
Class time	50 minutes
Class size	25
Number of sections, school	5
Facilities	
Space	Regular classrooms
Students/classroom/day	125
Utilization	100%
Furnishings	Air conditioning, pleasant environment; small, modern (partitions, file cabinets, storage cabinets, etc., loose table, chairs)
Staffing	
Teachers	1 classroom
Special teachers	0
Paraprofessionals	1
Other personnel	1 program director
Equipment	6 Cassette players (\$25) 6 tape recorder (\$150) Earphones (\$50)
Materials	Sound filmstrip sets Cassettes Workbooks and miscellaneous supplies
Pre-service Training	1 week
In-service Training	3 days
Other Support	Evaluation: \$10 per child
Incentives	300 books given as awards

## Appendix D

### SCALING OF STUDENT PERFORMANCE

A number of techniques are described in the literature on psychological scaling for making subjective judgments, and all of them yield a set of metric values associated with the stimuli (i.e., a paper or other sample of a student's performance). These numbers can be treated statistically like any other set of numbers since they have at the least, the property of addition (interval scale). The nature of the problem considered here makes the method of direct estimation appear most promising. This method has been described in a number of places by Stevens and Galanter.\* In direct methods of estimation, the judge assigns a number to each presented stimulus relative to a standard stimulus. For example, given a standard light intensity of value 10, other intensities are assigned a number relative to the standard. Usually, these estimates are ratio estimates; the judge estimates each stimulus as being either a fraction or a multiple of the standard. The method is not restricted to ratio estimation, however, and a ratio method is not recommended for use in evaluating student performance.

In estimating the value of samples of student's work, judges are provided two standard stimuli and all others are judged relative to the standards. Standards are chosen with scale values of 25 and 75, and judges are instructed to rate all papers from 0 to 100, with 0 defined as completely worthless and 100 as perfect. The score on any given paper is simply the average across judges and the reliability of a score is determined by a relatively few judges using a categorical scaling method or they would simply be picked by "experts." The adequacy of these procedures must be investigated.

All students in a program in the same grade would be given a common assignment, one that could be repeated at various times in the program. For example, fourth-grade students might write a paper on "What I Did Last Weekend." The important thing is that all students in a grade be given the same assignment; otherwise it would be impossible to scale papers across classes for the whole grade. Depending on the grade level and the competence

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\* Stevens, S. S., "A Metric for the Social Consensus," Science, 151, 1966, pp. 530-541. Galanter, E. H., "Contemporary Psychophysics," in New Directions in Psychology, Holt, New York, 1962, pp. 89-156.

of the students, several kinds of schoolwork should be sampled, such as writing assignments, arithmetic, social studies or science, and perhaps art. The type of work sampled and the specific nature of the assignment must be worked out with teachers because the assignments should be typical of the general schoolwork done in a specific school. These special assignments will not be graded or otherwise marked by the teachers. The students' names will appear on the papers, although they will be removed before judging and a code number assigned instead. After the code is assigned, the papers are given to a panel of judges and each judge assigns a score.

One of the major difficulties in consistent scoring of this type of material is that the stimuli are multidimensional. For example, a written paper may have uneven quality in level of content, organization, neatness and spelling. If judges differ in the relative weights they assign to various dimensions, poor interjudge reliability will result. While methods for multidimensional scaling exist, they are too complex to be feasible in the present application. To have all judges scoring along the same dimension, careful instructions have to be developed and tested for efficiency. Preliminary pilot investigations indicate that high interjudge reliability can be obtained and that the procedure eliminates the disagreement between judges (teachers) found in usual methods of scoring this kind of student performance; i.e., teacher grades.

The validity of the scaling method is determined primarily from measures of interjudge reliability. A related effort investigates the relationship between scaled scores and scores achieved on standardized tests for creativity, reading, and mathematics, so as to partially validate both kinds of scores. The primary analysis is based on a correlation study of the relationship between standardized and scaled scores. This analysis not only indicates the general agreement between the two scores, but allows for a more meaningful diagnosis of the kinds of discrepancies that occur. For example, the analysis might reveal that the correlation is poor for students scoring very low on the standardized test, indicating that low scorers on standardized tests tend to perform at a higher level on meaningful high level learning. Again, the correlation might be poor for students who are behavioral problems, indicating that poor behavior is manifested more on one kind

of performance measure than another. The pattern of discrepancies allows one to erect explanatory constructs and to attempt to isolate responsible variables. Of course, used in this way, the analysis is hypothesis-generating and not hypothesis-testing. But hypotheses generated by one set of data can be tested on another.

Appendix E

THE DELPHI ATTITUDE ESTIMATION METHOD

The purpose of this procedure is to determine attitudes about school objectives as seen by various members of the education community since an obvious source of disparity between the community and the school lies in the educational objectives each thinks are important. The method to be used for arriving at scaled attitudes is a modification of psychological scaling procedures and has been developed over several years at Rand. This method, generally referred to as Delphi, is becoming increasingly popular. Two important features of the technique are (1) participants construct attitude statements in their own language, and (2) a set of commonly agreed on statements are derived and scaled in terms of importance.

The method for obtaining attitudes about educational objectives consists of two independent operations. One is a procedure for generating attitude statements, and the second is a procedure for assigning relative values to the statements. The first operation will require two sessions (of about one hour in duration) with approximately 150 participants. These two sessions will result in a set of 15 to 20 statements about the objectives of education. In order to assure that the set of attitude statements cover a wide range, the participants must represent the various ethnic and SES subgroups of the school and community. For this purpose about 80 to 100 parents\* should participate and about 40 to 60 school personnel, making up the total sample size of 150 subjects. Attitude statements can then be separated by groups, or combined into a set of overall group statements. The latter is preferred because then differences between groups can be analyzed primarily in terms of differences in the importance assigned to each objective statement. Analysis

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\* The use of parents in this survey is dependent upon two conditions: (1) that low income parents will be amenable to the technique (preliminary evidence indicates this will not be a problem), (2) that this additional survey does not overburden parents who, as a group, are being rather extensively sampled and interviewed in the parent/community surveys.

is discussed in more detail below. It is important to note in the procedure that follows that it is not necessary to have all subjects together at the same time. The second operation, in which participants estimate the importance (or value) of each objective statement, requires very little of the participants' time.

In addition to determining subjects attitudes about education objectives, we will also have them evaluate their school in terms of how well it meets each objective.

The basic steps in the procedure for determining school objectives and for evaluating the schools are outlined below. These are expanded in the following pages.

#### OVERVIEW

##### Phase I. Determine School Objectives.

- a. All subjects generate education objective (EO) statements.
- b. A small (no more than 7 members) group of "experts" reduces the set of items generated by all groups to a list of 100-200 items by identifying highly similar items.
- c. All subjects sort the items in the reduced list into 20 or less categories on the basis of similarity of education objectives. We will also have them evaluate their school in terms of how well it meets each objective.
- d. A hierarchical clustering routine\* is employed to generate a set of common objectives, based on the sorting data from c. This list is expected to contain between 15 and 20 items.
- e. Each subject rates the relative importance of the items on the common list using the method of magnitude estimation.

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\* This is a technique for partitioning statements (or any object) into optimally homogeneous groups using empirical measures of similarity between statements. The technique merges clusters in a step-wise fashion beginning with each statement as a separate cluster to all statements merged into a single cluster. The user selects the level of discrimination which suits his purpose.

At this point, a set of EO statements have been generated and their importance rated within each group. Differences in EO as seen by the different groups can then be investigated.

#### Phase II. Evaluate Schools

The second phase of the evaluation is to determine how subjects feel about their school in terms of the EO generated by Phase I. This is accomplished by having all subjects rate their school in terms of how well they feel the school meets each of the objectives generated by "d".

The above outline briefly states the steps in the procedure that will be carried out in the evaluation. Each of these steps will be elaborated in detail.

#### Detailed Procedure

In the first session, subjects are instructed to write out three to seven statements about what they think EO should be. The following is an abbreviated illustration of the instructions to be read to all groups of subjects:

The purpose of this session is to let you state what you think the goals of (elementary and high school) education should be. That is, what are the most important things that the schools should accomplish both for the students and for the community. You have been given a set of 4 x 5 cards. On each card write one statement saying what you think an important goal for the schools should be. Write down at least three such statements, but no more than seven. Write only one statement on each card. Write down what you think are the most important things the schools should accomplish, even if you think some of these are not being done, or not being done well, by the schools right now. Are there any questions?

Many of the statements obtained will obviously be like other statements, and some will obviously differ from others, with many statements that are neither (obviously) alike or different. The next step is to reduce the number of statements by pooling those of common meaning. A small group of five to seven experts\* will take the combined list of objectives from all or the subject groups and identify those with highly

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\*An expert panel will consist of several individuals selected from the school and community.



similar or identical meanings. With 150 subjects the original list will probably have between 600 and 800 items. By identifying the very similar items, hopefully a compression to less than 200 items can be accomplished.

The reduced list of statements will be reproduced on 4 x 5 cards and all subjects will rate these statements in terms of their common meaning. Subjects will be instructed to place the statements into 20 categories with similar statements in the same category. They will be instructed to place some statements in all categories forcing equal spread across categories for all subjects. Each subject will perform this exercise independently so that 150 separate ratings will be obtained. The following instructions are read to the subjects at this step:

You will be given a set of cards on each of which is a statement of an education objective. We would like you to place the cards in 20 separate piles, so that all statements in the same pile are alike, or nearly alike and statements in different piles are different. Some of these statements, will be very much like other statements, and others will be very different. Sometimes it will be difficult to tell if two statements are alike or different. Don't worry about being exactly right in these cases, and do the best you can.

The next step is to combine the individual judgments of item similarity into a single set of 15 to 20 statements which represent the "average" agreement in the group. The derivation of this final set of objective statements is accomplished by the method of hierarchical clustering. This completes the procedure for developing a set of attitude statements defining education objectives.

In order to evaluate the relative importance of each statement, the subjects will rate statements using the technique of direct or magnitude estimation. In this method, the subjects simply assign a number between 0 and 100 to each statement where 100 is the highest value and 0 is the lowest. Subjects will be given a list of the statements, with a space marked beside each one for their value estimates. The following instructions will be read to the subjects:

On the sheet in front of you there are 20\* statements about education objectives. These 20 have been reduced from the original ones that each of you wrote out in the first exercise. These statements may not completely cover everything that all of you feel are important, but they should cover the ones you felt were the most important, and in many cases, the only difference between what you may have said and the statement in front of you is a matter of wording. What we would like you to do now is to tell us how important you think each of these statements is. You will note that beside each statement there is a place for your estimate. We would like you to estimate the importance of each objective by assigning it a number from 0 to 100, where 0 is not at all important, and 100 is most important. Do this for each statement so that when you finish, the most important statement has the highest score. (Example)

The result is a set of rated statements about education objectives.

### Evaluation of Schools

In the final phase subjects will be asked to rate their school in terms of the EO statements. Again, they will use a number from 0 to 100 to indicate how well their school meets each objective. Subjects will also be asked to give a general estimate of how well they think their school is doing. A space on the back of the objective statement sheet will be included for this.

The following instructions will be read to the subjects:

On the sheet in front of you there are 20 statements about education objectives. These were produced by a group selected from your school and community. What we would like you to do is to rate your school on how well it meets each of these objectives. If you think your school meets an objective as well as it is possible give it a score of 100 on this objective. If you think your school does not meet the objective at all, give it a score of 0. Use a number between 0 and 100 to represent where you think the school stands in meeting each objective.

When this is finished, subjects will be instructed to turn the page and the following instructions will be given:

Now we would like you to estimate how pleased you are with your school in general. Again use a number from 0 to 100, with 100 meaning you are very pleased.

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\* Whatever number (15 to 20) are selected from the hierarchical clustering analysis.

### Analysis

The full study described above would furnish a rich body of data for analysis. The basic focus would be on the similarities and differences in evaluation between the groups. Several investigations can be made from the same data base: (1) The differences in perceived objectives can be made explicit by generating separate sets of clusters for each group, using just the sortings of that group in the hierarchical clustering routine. (2) Differences in perception of the relative importance of the common objectives can be generated by computing group importance ratings for each group separately and subjecting the data to an analysis of variance. (3) The usefulness of the common set of objectives for predicting the overall degree of satisfaction of the groups with present educational systems (separately, or in common) can be examined by computing the linearly weighted combinations of the individual's ratings of his school, and comparing this with his overall rating. Another approach to the same question could be carried out by computing the estimation weights for each of the objectives in a linear estimation model for overall satisfaction.

Appendix F

TEST MATERIALS

# COOPERSMITH SELF-ESTEEM INVENTORY

Please mark each statement in the following way:

If the statement describes how you usually feel, put a check (✓) in the column, "Like Me."

If the statement does not describe how you usually feel, put a check (✓) in the column, "Unlike Me."

There are no right or wrong answers.

	<u>Like Me</u>	<u>Unlike Me</u>
1. I spend a lot of time daydreaming.	_____	_____
2. I'm pretty sure of myself.	_____	_____
3. I often wish I were someone else.	_____	_____
4. I'm easy to like.	_____	_____
5. My parents and I have a lot of fun together.	_____	_____
6. I never worry about anything.	_____	_____
7. I find it very hard to talk in front of the class.	_____	_____
8. I wish I were younger.	_____	_____
9. There are lots of things about myself I'd change if I could.	_____	_____
10. I can make up my mind without too much trouble.	_____	_____
11. I'm a lot of fun to be with.	_____	_____
12. I get upset easily at home.	_____	_____
13. I always do the right thing.	_____	_____
14. I'm proud of my school work.	_____	_____
15. Someone always has to tell me what to do.	_____	_____
16. It takes me a long time to get used to anything new.	_____	_____
17. I'm often sorry for the things I do.	_____	_____
18. I'm popular with kids my own age.	_____	_____
19. My parents usually consider my feelings.	_____	_____
20. I'm never unhappy.	_____	_____
21. I'm doing the best work that I can.	_____	_____

	<u>Like Me</u>	<u>Unlike Me</u>
22. I give in very easily.	_____	_____
23. I can usually take care of myself.	_____	_____
24. I'm pretty happy.	_____	_____
25. I would rather play with children younger than me.	_____	_____
26. My parents expect too much of me.	_____	_____
27. I like everyone I know.	_____	_____
28. I like to be called on in class.	_____	_____
29. I understand myself.	_____	_____
30. It's pretty tough to be me.	_____	_____
31. Things are all mixed up in my life.	_____	_____
32. Kids usually follow my ideas.	_____	_____
33. No one pays much attention to me at home.	_____	_____
34. I never get scolded.	_____	_____
35. I'm not doing as well in school as I'd like to.	_____	_____
36. I can make up my mind and stick to it.	_____	_____
37. I really don't like being a boy -- girl.	_____	_____
38. I have a low opinion of myself.	_____	_____
39. I don't like to be with other people.	_____	_____
40. There are many times when I'd like to leave home.	_____	_____
41. I'm never shy.	_____	_____
42. I often feel upset in school.	_____	_____
43. I often feel ashamed of myself.	_____	_____
44. I'm not as nice looking as most people.	_____	_____
45. If I have something to say, I usually say it.	_____	_____
46. Kids pick on me very often.	_____	_____
47. My parents understand me.	_____	_____
48. I always tell the truth.	_____	_____
49. My teacher makes me feel I'm not good enough.	_____	_____

	<u>Like Me</u>	<u>Unlike Me</u>
50. I don't care what happens to me.	_____	_____
51. I'm a failure.	_____	_____
52. I get upset easily when I'm scolded.	_____	_____
53. Most people are better liked than I am.	_____	_____
54. I usually feel as if my parents are pushing me.	_____	_____
55. I always know what to say to people.	_____	_____
56. I often get discouraged in school.	_____	_____
57. Things usually don't bother me.	_____	_____
58. I can't be depended on.	_____	_____

SEARS SELF-CONCEPT

Name \_\_\_\_\_ Boy \_\_\_\_\_ Girl \_\_\_\_\_ Grade \_\_\_\_\_  
Teacher \_\_\_\_\_

Some boys and girls have thought about the things they do and decided that the items on these pages were helpful in thinking about themselves. This is a chance for you to look at yourself and decide what your strong points are and what your weak points are. This is not a test; we expect everyone to have different answers -- so be sure your answers show how you think about yourself. Your answers are private and will be kept in confidence.

Read each item and then answer the question: Compared with other boys and girls my age, how do I rate now?

Find the line under whatever heading indicates your answer. (The words at the top show what the lines in each column stand for.) Mark an X on that line. Now go right ahead. Work as fast as you like.



	Excellent	Very good	Better than most	OK	Not so good
1. Being good at sports	-----	-----	-----	-----	-----
2. Learning things rapidly	-----	-----	-----	-----	-----
3. Making friends easily	-----	-----	-----	-----	-----
4. Having new, original ideas	-----	-----	-----	-----	-----
5. Getting my school work done on time and not getting behind	-----	-----	-----	-----	-----
6. Being able to read well	-----	-----	-----	-----	-----
7. Being a good size and build for my age	-----	-----	-----	-----	-----
8. Remembering what I've learned	-----	-----	-----	-----	-----
9. Being willing for others to have their way sometimes	-----	-----	-----	-----	-----
10. Solving problems in ways others haven't tried	-----	-----	-----	-----	-----
11. Being confident, not shy nor timid	-----	-----	-----	-----	-----
12. Knowing how to do math	-----	-----	-----	-----	-----
13. Being good at things that require physical skill	-----	-----	-----	-----	-----
14. Being a good student	-----	-----	-----	-----	-----
15. Being a leader--one to get things started with my own sex	-----	-----	-----	-----	-----
16. Thinking up answers to problems--answers no one else has thought of	-----	-----	-----	-----	-----
17. Being able to concentrate	-----	-----	-----	-----	-----
18. Being interested in science; learning about things that scientists do	-----	-----	-----	-----	-----

	Excellent	Very good	Better than most	OK	Not so good
19. Being attractive, good looking	-----	-----	-----	-----	-----
20. Having brains for college	-----	-----	-----	-----	-----
21. Making other people feel at ease	-----	-----	-----	-----	-----
22. Learning about new things even when other people aren't interested--studying about things on my own	-----	-----	-----	-----	-----
23. Getting a lot of fun out of life	-----	-----	-----	-----	-----
24. Writing creative stories and poems	-----	-----	-----	-----	-----
25. Being a good athlete	-----	-----	-----	-----	-----
26. Being able to apply what I've learned	-----	-----	-----	-----	-----
27. Having plenty of friends among my own sex	-----	-----	-----	-----	-----
28. Seeing new ways of thinking about things and putting ideas together	-----	-----	-----	-----	-----
29. Spending most of my time on my work, not goofing off	-----	-----	-----	-----	-----
30. Having good handwriting even when I'm hurried	-----	-----	-----	-----	-----
31. Being not too skinny, not too fat	-----	-----	-----	-----	-----
32. Having brains	-----	-----	-----	-----	-----
33. Being sensitive to what others are feeling	-----	-----	-----	-----	-----
34. Being able to see things in my mind easily when I want to	-----	-----	-----	-----	-----
35. Being able to change things when they don't suit me	-----	-----	-----	-----	-----

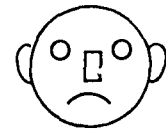
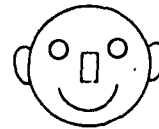
	Excellent	Very good	Better than most	OK	Not so good
36. Being able to spell correctly	-----	-----	-----	-----	-----
37. Enjoying games and sports	-----	-----	-----	-----	-----
38. Being smart	-----	-----	-----	-----	-----
39. Being active in social affairs with my own sex	-----	-----	-----	-----	-----
40. Being interested in new things; excited about all there is to learn	-----	-----	-----	-----	-----
41. Well organized; having materials ready when needed	-----	-----	-----	-----	-----
42. Learning about people around the world and being interested in them	-----	-----	-----	-----	-----
43. Having nice features (nose, eyes, etc.)	-----	-----	-----	-----	-----
44. Knowing what to do to get the right answer to a problem	-----	-----	-----	-----	-----
45. Being easy to get along with	-----	-----	-----	-----	-----
46. Letting my imagination go when I want to	-----	-----	-----	-----	-----
47. Enjoying myself in school	-----	-----	-----	-----	-----
48. Doing well in art work, painting, or drawing	-----	-----	-----	-----	-----

ATTITUDE TOWARDS SELF AND SCHOOL (GRADE 1-3)

MARK THE NOSE OF THE FACES YOU CHOOSE

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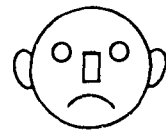
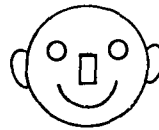
1. How do you feel about growing up and getting older?



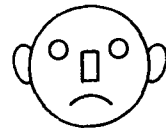
2. How do you feel when it's time to get up and go to school?



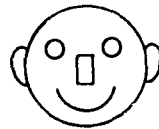
3. How do you feel when you have a chance to learn something new?



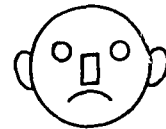
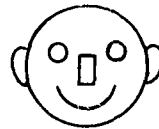
4. How do you feel when you think about going home after school each day?



5. How do you feel when the teacher tells you to get out your books and begin to work?



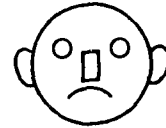
6. How do you feel when you think about how fast you learn?



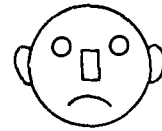
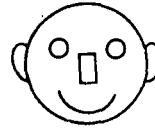
7. How do you feel when the teacher says that she is going to give a test?



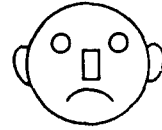
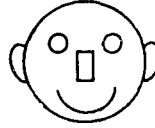
8. How do you feel about how healthy and strong you are?



9. How do you feel about how well you read?



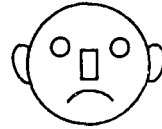
10. How do you feel about the way the neighbors treat you?



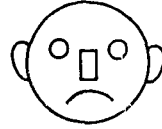
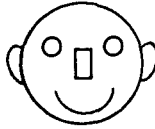
11. How do you feel about how you look and the kind of face you have?



12. How do you feel about the way the other children treat you?



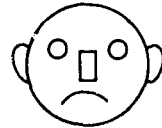
13. How do you feel when you get your report card and take it home?



14. How do you feel about how much you know?



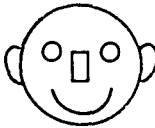
15. How do feel about how well you do arithmetic?



16. How do you feel when you think about next year in school?



17. How do you feel about the way your teacher treats you?



18. How do you feel when the teacher says that it's your turn to read out loud before the group?



STUDENT SURVEY

(Grades 4-8)

	Circle Appropriate Response	
	<u>Yes</u>	<u>No</u>
1. Do you like school?	1	2
2. Do you need more help from your teacher?	1	2
3. Do you read books from a library?	1	2
4. Do you like your school?	1	2
5. Do you enjoy field trips?	1	2
6. Do field trips help you in schoolwork?	1	2
7. Do you get along better outside of school than in school?	1	2
8. Would you like to spend more time at school?	1	2
9. Are you satisfied with the grades on your report card?	1	2
10. Do you worry about your schoolwork?	1	2
11. Are you doing better in your schoolwork this year?	1	2
12. Do you look forward to coming to school each morning?	1	2
13. Do you talk about school at home?	1	2
14. Has someone from home ever talked to your teachers?	1	2
15. Do you get praise at home for good schoolwork?	1	2
16. Do you think you will graduate from high school?	1	2
17. Do you hope to go to college?	1	2
18. Do you talk at home about what kind of job or career you will have after you are out of school?	1	2
19. Do you read more than is required by your schoolwork?	1	2
20. Do you think your teachers usually expect too much of you?	1	2
21. Do your teachers think you are doing well in your schoolwork?	1	2

	Circle Appropriate Response	
	<u>Yes</u>	<u>No</u>
22. Do your parents think you are doing well in your schoolwork?	1	2
23. Do you think you could do well in any school subject if you studied hard enough?	1	2
24. Are your lowest grades usually your teacher's fault?	1	2
25. Do you think you could do well in any kind of job you choose?	1	2

Items for Achievement Motivation Inventory

No Yes  
1 2 3 4 5 6

1. When you know there are going to be one or two questions on a test from outside reading assignments, do you always read all the material?
2. Do you regard yourself as a more consistent and harder worker in your classroom assignments than the typical student in your classes?
3. Have others (not your good friends) thought of you as one who "missed some of the fun" because you were so serious?
4. Do you think your fellow students think of you as a hard worker?
5. Do most of your teachers probably think of you as one of their hardest workers even though not necessarily one of the brightest?
6. Do other interests (sports, extra-curricular activities, or hobbies) prevent you from obtaining an excellent rating or mark for effort in school work?
7. Do you have a very strong desire to excel academically?
8. Do you try harder to get on the school honor roll or merit list than the average student in your class?
9. Do you try to do most jobs at least a little better than what you think is expected?
10. Do you tend to give up or delay on uninteresting assignments?
11. Which do failures most often tend to do to you?  
(Y) Start you off on some new interest.  
(N) Spur you to new efforts in the thing at which you failed.
12. Are your friends more likely to consider you as  
(Y) Casual and carefree.  
(N) Responsible.



Appendix G

INFORMATION CATEGORIES AND OUTCOME DIMENSIONS

INFORMATION CATEGORIES

OUTCOME DIMENSIONS

1. Education Results

Political/Social

1. Practitioner assessment of local schools
2. Educational goals of practitioners
3. Practitioner's opinions about EEVD
4. Parent participation in education of children

Economic/Cost

5. Changes in performance of educational market

Educational

6. Cognitive achievement
7. Affective growth
8. Educational objectives of school personnel
9. Teaching plans and practices
10. Sociology of the classroom

2. Attitudes of practitioners

Political/Social

1. Practitioner assessment of local schools
2. Educational goals of practitioners
3. Practitioners' opinions about school integration
4. Practitioners' opinions about EEVD

Educational

5. Educational objectives of school personnel
6. Teaching plans and practices

3. Programs and processes

Political/Social

1. Educational goals of practitioners
2. Allocation of decision making authority
3. Administrative organization, practice and behavior
4. Status perquisites within school system
5. Parent involvement in school-related activities

INFORMATION CATEGORIES

OUTCOME DIMENSIONS

4. Attributes of new schools

Economic/Cost

6. Structural changes in educational market place
7. Behavior changes in educational suppliers
8. Changes in performance of educational market
9. Changes in resource allocation
10. Changes in fiscal flows

Educational

11. Educational objectives of school personnel
12. Teaching plans and practices
13. Sociology of the classroom

Political/Social

1. Practitioner assessment of local schools
2. Educational goals of practitioners
3. Practitioners' opinion about school integration
4. Administrative organization, practice and behavior
5. Legal and constitutional ramifications
6. Status perquisites within school system
7. SES distribution of students
8. Parent opinions on integration
9. Parent involvement in school-related activities

Economic/Cost

10. Structural changes in educational market place
11. Behavior changes in educational suppliers
12. Changes in performance of educational market
13. Changes in resource allocation
14. Changes in fiscal flows

Educational

15. Educational objectives of school personnel
16. Teaching plans and practices
17. Sociology of the classroom

INFORMATION CATEGORIES

OUTCOME DIMENSIONS

5. Distributions of students

- Political/Social
1. Practitioners' opinion about school integration
  2. Demonstration area relationship to outside agencies
  3. Legal and constitutional ramifications
  4. SES distribution of students
  5. Parent mobility
  6. Community assessment of local schools

- Economic/Cost
7. Behavior changes in educational suppliers

- Educational
8. Sociology of the classroom

6. Allocation of resources

- Political/Social
1. Focus and scope of political authority
  2. Demonstration area relationship to outside agencies
  3. Allocation of decision making authority
  4. Legal and constitutional ramifications
  5. Position of professionals in community
  6. Status perquisites within school system

- Economic/Cost
7. Behavior changes in educational suppliers
  8. Changes in resource allocation
  9. Changes in fiscal flows

7. Financial impacts

- Political/Social
1. Demonstration area relationship to outside agencies
  2. Legal and constitutional ramifications
  3. Voting behavior

- Economic/Cost
4. Changes in fiscal flows

INFORMATION CATEGORIES

OUTCOME DIMENSIONS

- |                                  |  |
|----------------------------------|--|
| 8. Governance and administration | <p>Political/Social</p> <ol style="list-style-type: none"><li>1. Educational goals of practitioners</li><li>2. Practitioners' opinions about EEVD</li><li>3. Focus and scope of political authority</li><li>4. Demonstration area relationship to outside agencies</li><li>5. Allocation of decision making authority</li><li>6. Administrative organization, practice and behavior</li><li>7. Legal and constitutional ramifications</li><li>8. Position of professionals in community</li><li>9. Legal and constitutional ramifications</li><li>10. Parent involvement in school-related activities</li><li>11. Inter-group conflict and cooperation</li><li>12. Political and social participation</li><li>13. Voting behavior</li><li>14. Political mobilization</li></ol> |
|                                  | <p>Economic/Cost</p> <ol style="list-style-type: none"><li>15. Behavior changes in educational suppliers</li></ol>   |
| 9. Status of professionals       | <p>Political/Social</p> <ol style="list-style-type: none"><li>1. Practitioner assessment of local schools</li><li>2. Educational goals of practitioners</li><li>3. Practitioners' opinions about EEVD</li><li>4. Focus and scope of political authority</li><li>5. Allocation of decision making authority</li><li>6. Administrative organization, practice and behavior</li><li>7. Legal and constitutional ramifications</li><li>8. Position of professionals in community</li><li>9. Status prerequisites within school system</li><li>10. Parent involvement in EEVD options</li></ol>   |

INFORMATION CATEGORIES

OUTCOME DIMENSIONS

- |  |   |
|--|---|
| 10. Parent attitudes and responses         | <p style="text-align: center;">Political/Social</p> <ol style="list-style-type: none"><li>1. SES distribution of students</li><li>2. Parent judgments of educational opportunities</li><li>3. Parent assessment of local schools</li><li>4. Parent opinions on integration</li><li>5. Parent assessment of EEVD</li><li>6. Parent participation in education of children</li><li>7. Parent involvement in school-related activities</li><li>8. Parent mobility</li><li>9. Parent involvement in EEVD options</li><li>10. Community assessment of local schools</li></ol>  |
| 11. Community attitude and responses       | <p style="text-align: center;">Political/Social</p> <ol style="list-style-type: none"><li>1. Community attitudes toward education</li><li>2. Community opinions on integration</li><li>3. Community assessment of EEVD</li><li>4. Community attitudes to political activism</li><li>5. Inter-group conflict and cooperation</li><li>6. Political and social participation</li><li>7. Political mobilization</li><li>8. Voting behavior</li></ol>  |
| 12. Consequences beyond demonstration area | <p style="text-align: center;">Political/Social</p> <ol style="list-style-type: none"><li>1. Practitioners' opinions about EEVD</li><li>2. Focus and scope of political authority</li><li>3. Demonstration area relationship to outside agencies</li><li>4. Legal and constitutional ramifications</li><li>5. Position of professionals in community</li><li>6. SES distribution of students</li><li>7. Parent assessment of EEVD</li><li>8. Parent mobility</li><li>9. Community assessment of local schools</li><li>10. Community attitudes toward education</li><li>11. Community opinions on integration</li><li>12. Community assessment of EEVD</li><li>13. Community attitudes to political activism</li><li>14. Inter-group conflict and cooperation</li><li>15. Political mobilization</li><li>16. Voting behavior</li></ol> |

Appendix II

SCHEDULE OF WORK AND PROFESSIONAL STAFF TIME REQUIREMENTS

The following figures show the time scheduling of the four major work elements of the evaluation task, as set forth in text Table V-1. They do not show all work elements to be included in Phase II of the Analysis and Survey Contract, because a number of them are either continuous (general management, analysis of policy implication) or available on call (technical supports services for mathematics and statistics, consulting or educational test and measurement problems).

The figures are as follows:

<u>Figure</u>	<u>Title</u>
A-1	Political/Social Analysis Component Tasks
A-2	Economic and Resource Analysis Component Tasks
A-3	Educational Analysis Component Tasks
A-4	Information Flow Component Tasks

Each figure shows time period by task, and Rand professional staff time requirements by component, during the pre-demonstration and demonstration periods.

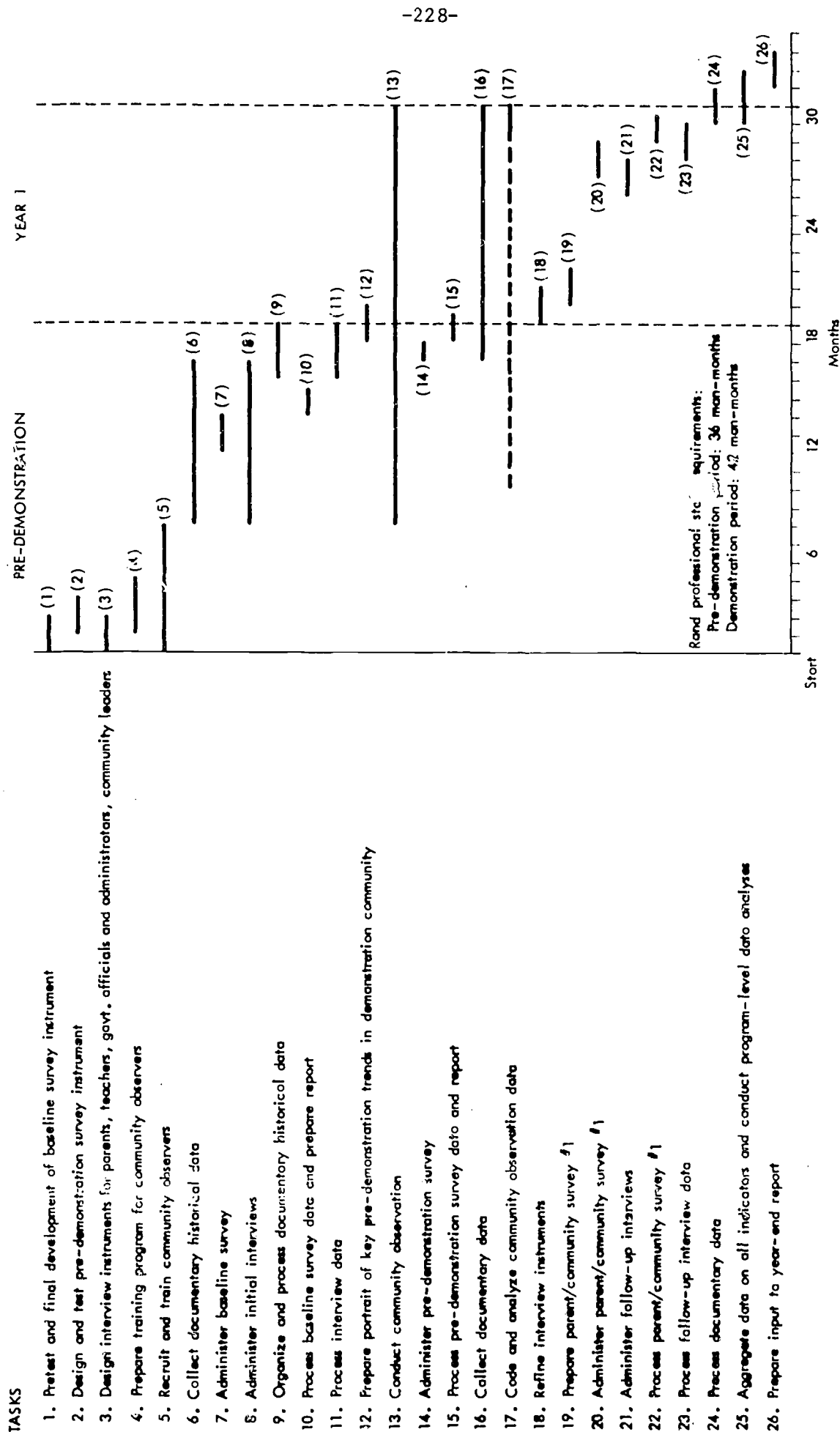


Fig. A-1 — Political and social analysis component tasks

TASKS

- \*1. Collect baseline and historical data on market structure, behavior and performance
- 2. Develop formats for educational programmatic profile analysis
- 3. Develop model for resource analysis
- 4. Develop model for analyzing funding flows
- 5. Collect baseline data (programs, resources, funding)
- 6. Analyze data-develop programmatic profile, etc.
- 7. Test feasibility of formats and models
- 8. Document baseline status
- 9. Modify formats and procedures
- \*10. Analyze organization of educational market and competitive conditions
- 11. Document procedures for tasks 2-4 for operation (input for year-end report)
- \*12. Document and report market organization (input for year-end report)
- 13. Collect year-end data
- 14. Analyze changes
- \*15. Monitor changes in behavior, structure, and performance
- \*16. Analyze changes in organization and competition conditions
- \*17. Document and report history of changes in organization, etc. (input for year-end report)
- 18. Document program and resource impact (input for year-end report)
- \*Develops economic task

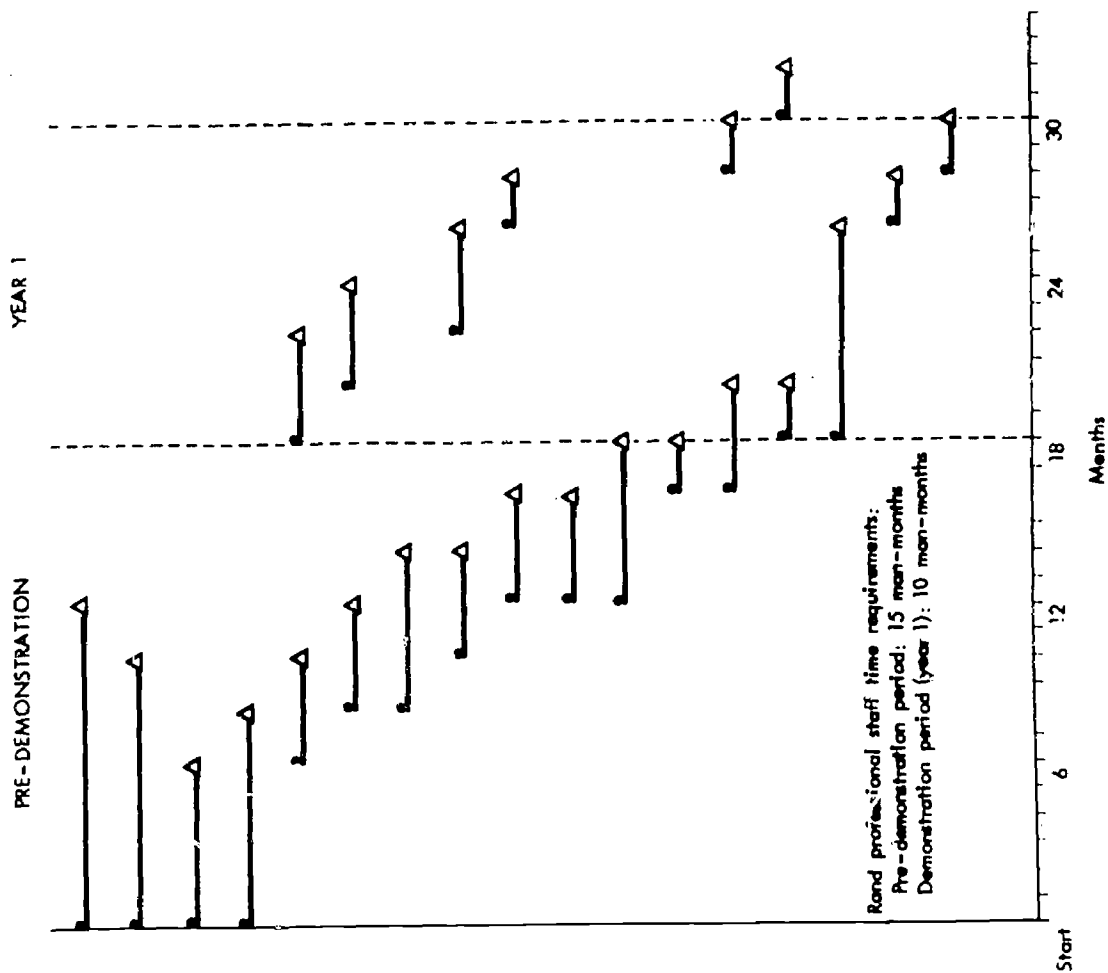


Fig. A-2—Economic and resource analysis component tasks



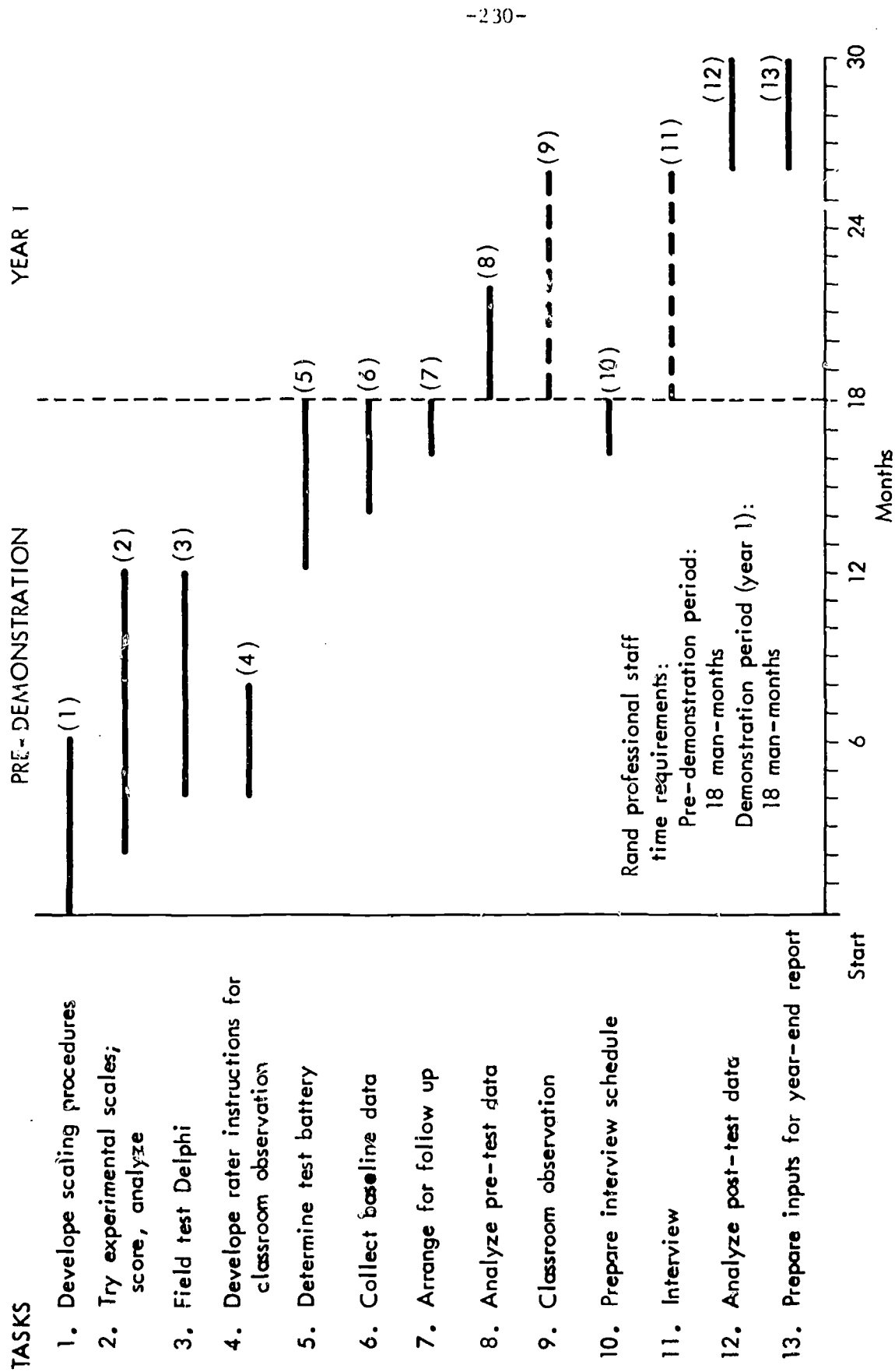


Fig. A-3—Educational analysis component tasks

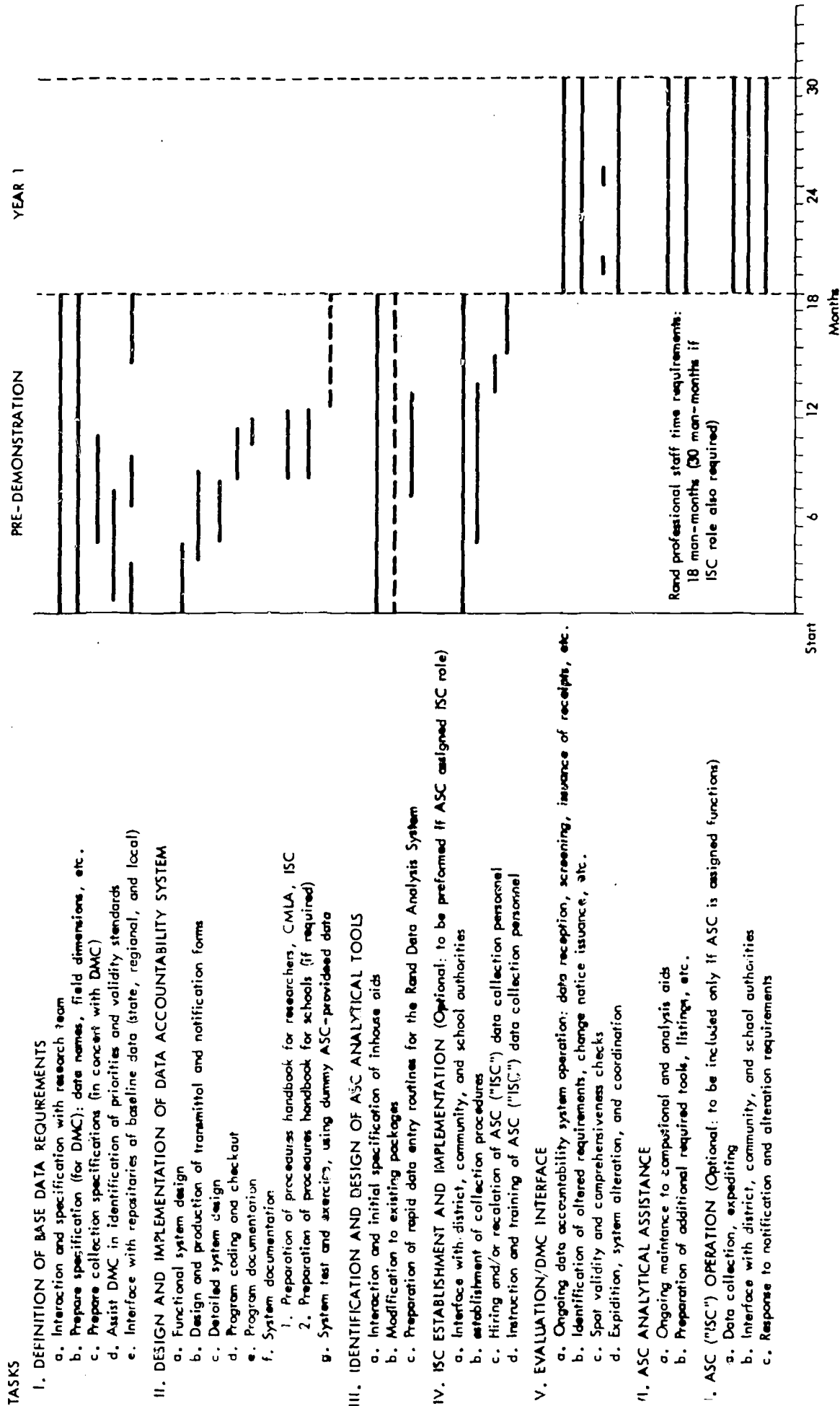


Fig. A-4—Information flow component tasks

## Appendix I

### BIOGRAPHIES OF RAND STAFF FOR EEVD

Senior Rand project staff will include political scientists, educators, sociologists, economists, psychologists, statisticians, information specialists, and cost analysts.

This section provides biographical data on the senior staff:

Polly Carpenter, education  
Stephen Carroll, economics  
Theodore Donaldson, psychology  
John Farquhar, information science  
Sue Haggart, cost analysis  
George Hall, economics  
Milbrey McLaughlin, education  
Anthony Pascal, economics  
John Pincus, economics  
Marjorie Rapp, educational psychology  
John Rolph, statistics  
Daniel Weiler, political science  
Barbara Williams, sociology

EEVD assignments for senior staff are discussed in Chapter V. The current plan is as follows:

Project director -- Pincus  
Project deputies -- Hall, Weiler  
Education task group -- Donaldson, Rapp, McLaughlin, Carpenter  
Political/Social task group -- Weiler, Williams, McLaughlin,  
Pascal  
Economic/Cost task group -- Hall, Haggart, Pascal, Carroll  
Technical support, information system -- Farquhar  
Technical support, statistics -- Rolph  
Liaison assignments:  
DMC -- Farquhar  
Field Research Corporation -- Williams  
OEO -- Pincus, Hall

EVA -- to be assigned for each site  
ISC -- Williams and site director